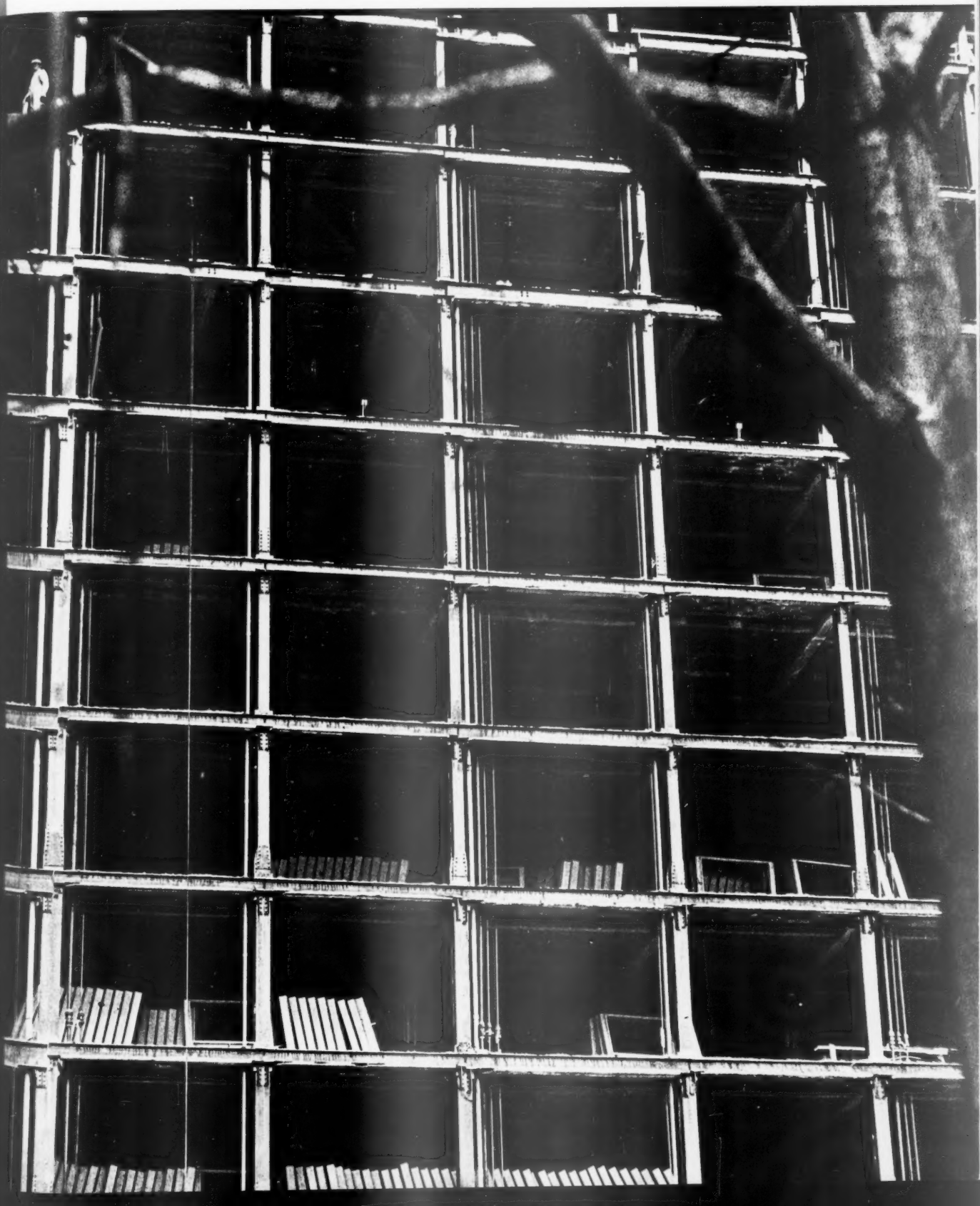
January 1933

TECHNOLOGY REVIEW



I *really don't know if I should smoke . . .*

. . . but my brothers and my sweetheart smoke, and it does give me a lot of pleasure.

Women began to smoke, so they tell me, just about the time they began to vote, but that's hardly a reason for women smoking. I guess I just like to smoke, that's all.

It so happens that I smoke CHESTERFIELD. They seem to be milder and they have a very pleasing taste.

the Cigarette that's Milder

the Cigarette that Tastes Better

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THE TABULAR VIEW

VANNEVAR BUSH, before becoming Vice-President of M.I.T. and Dean of Engineering, was Professor of Electric Power Transmission here. It was he who conceived and developed the product integraph and the differential analyzer ("thinking machines"), as well as the network analyzer for reproducing and studying in the laboratory entire electrical transmission systems. He is the author of "Operational Circuit Analysis" and joint author of "Principles of Electrical Engineering." A graduate of Tufts College, he holds a doctorate of engineering from M.I.T. ('16). ¶ JOHN E. BURCHARD, 2D, is well known for the research work he has directed in the field of housing. From his graduation in 1923 until 1930 he taught first in the Civil Engineering and then in the Architectural Department at the Institute. Recently he has been assisting Mr. A. Farwell Bemis, '93, who for years has been one of the most serious American students of all phases of housing, in the preparation of a book entitled "The Evolving House." This book will appear in three volumes under the ægis of the Technology Press, and the first volume, *The Past*, will shortly be available to the public. ¶ MR. BURCHARD has much to say on the various left-wing projects which have been advanced as solutions of the housing problem. We are happy to have the kind permission of *Pencil Points* to supplement Mr. Burchard's prose discussion with the following quotations from a poetic parable by William Adams Delano, which was published in the November issue of that magazine:

"At graduation Willie, who'd
Stood well in all his classes,
As subject for his Thesis chose
'Cheap Housing for the Masses.'
This gave his genius ample scope
And he produced a thing
Halfway between a gas tank
And a greenhouse on the wing. . . .
In time the house was finished;
In the heat of mid July,
It stood all bright and glistening
Against a cloudless sky. . . .
In spite of all his parents said,
Young Willie was insistent
That he must make this house his home —
Boy-like he was persistent. . . .
On Friday night they grew alarmed
And battered in the door;
The heat was like an oven — one
Could scarcely touch the floor.
In a corner of the parlor
In the room he had created
They found a pile of ashes — which
Was Willie well cremated."

LEROY L. THWING, '03, writes that he inhaled cast-iron dust in machine shops and burnt sand in foundries for a number of years, but finally escaped into the open air as a valuating engineer and tax consultant. As a relaxation, he collected data on the history of applied technology and is now connected with the New York Museum of Science and Industry.

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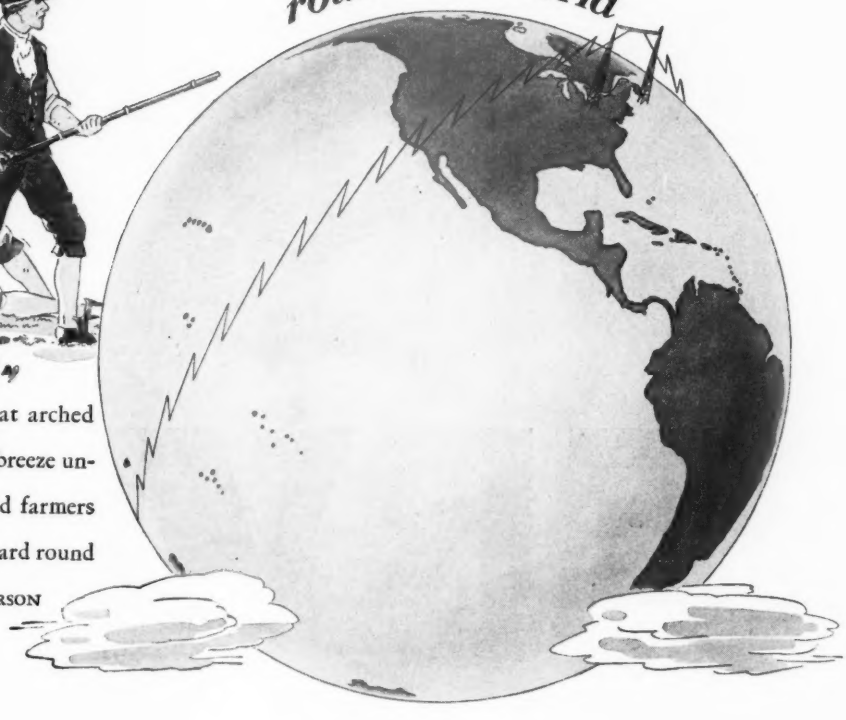
The shot ACTUALLY *heard round the world*

"By the rude bridge that arched the flood,
Their flag to April's breeze unfurl'd;
Here once the embattl'd farmers stood,
And fired the shot heard round the world."

EMERSON



ON the one hundred and fifty-seventh anniversary of the Battle of Concord, a shot was actually heard round the world. Fired from a musket that was used in that battle, it was broadcast round the world from General Electric's short-wave radio station.

The sound of the shot made the 24,000-mile loop in one-eighth of a second, and on its return was loud enough to be rebroadcast over the longer waves of station WGY. To do this, the sound was sent out from station W2XAD, on 19.56 meters, to Holland, where it was relayed to Java, which in turn rebroadcast it to Australia, where it was relayed back to Schenectady, being received on 28.5 meters. The fact that the shot was sent out on 19 meters and returned on 28 meters is proof that it completely circled the world.

This dramatization of Emerson's lines was made possible because of research and developments in the electrical industry — developments that are largely the work of college-trained engineers. They are leading the way to even greater progress and are helping to maintain General Electric's leadership in the electrical industry.

95-952DH

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A man with a MODERN

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One vast modernization program in the public eye at this time is that of The Philadelphia and Reading Coal and Iron Company, the latest unit of which, the great new St. Nicholas breaker near Shenandoah, Pa., has just come into operation.

In the planning and construction of this brand new type of breaker, the G.T.M. was privileged to work with the Company's far-visioned engineers in specifying the conveyor belting and hose for the St. Nicholas plant. This opportunity came to the G.T.M. because the Company already had had profitable experience with the G. T. M. service and Goodyear Mechanical Rubber Goods quality.

As a result, over 3½ miles more of Goodyear Conveyor Belting is now in The Philadelphia and Reading Coal and Iron Company's service—the entire belting and hose equipment of the St. Nicholas breaker — every foot and ply of it expertly specified to its duty by the G. T. M. and specially built for its job by Goodyear.

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THE TECHNOLOGY REVIEW

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Edited at the Massachusetts Institute of Technology

VOLUME 35 NUMBER 4

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Editor
J. RHYNE KILLIAN, JR.

Publisher
HAROLD E. LOBDELL

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John Skara — Chicago Camera Club

TRAIN SPEEDS IN 1932

TWO years ago The Review compiled and published a table showing the average speeds maintained between terminals by the fastest scheduled trains on 30 representative runs between metropolitan centers in the United States and Canada. The runs ranged in length from 226 miles (New York–Washington) to 2,886 miles (Montreal–Vancouver), and aggregated a total mileage of over 30,000. A summation of the hours and mileages of the speediest flyers on each of the 30 runs indicated a combined average in 1930 of 40.9 miles per hour as compared with corresponding figures of 34.0 and 34.6 in 1920 and 1910, respectively.

Bringing the table up to date shows that faster service was being offered at the end of 1932 than in 1930 on 12 of the runs. On six runs average speeds were slower, while on the remaining 12 the rates of the fastest trains were unchanged from the1930 figures. The combined average for the 30 runs was 40.7 miles per hour at the end of 1932, or about 0.4 of 1% less than in 1930.

Averages of better than 50 miles per hour existed on three runs in 1930: Toronto–Montreal (Canadian National's *Inter-City*, 55.6), N. Y.–St. Louis (N. Y. C.'s *Southwestern*, 50.3), and N. Y.–Washington (Pennsylvania's *Congressional*, 50.2). The first two trains were maintaining the same schedules at the end of 1932, but the *Congressional* had been stepped up to 53.2. Also two additional runs had shifted to the "50-mile-an-hour" group: N. Y.–Chicago (N. Y. C.'s *20th Century*, 53.4) and Chicago–Pittsburgh (Pennsylvania's *Broadway*, 52.6).

THE
TECHNOLOGY
REVIEW

Vol. 35, No. 4 January, 1933

The Inscrutable 'Thirties

Reflections Upon a Preposterous Decade

By Vannevar Bush

Editorial Note: This article is presented as a preprint of a paper that might be found many years hence among the literary effects of the present Vice-President of the Massachusetts Institute of Technology, or else as a paper that may be written by some future Vice-President of M.I.T. and printed in this magazine when the present decade has receded into the "landscape of the past."

A REVIEW of the mode of living of our forefathers, if it is to be useful, should be sympathetic in its attitude. The lapse of time often obscures the difficulties surrounding a former generation, and we are apt to smile at crudities when a just estimate should rather leave us to marvel that so much was accomplished with so little.

It is especially pertinent that we should review the technical accomplishments of another period only in the light of the contemporary science. Otherwise, we may well be guilty of a patronizing complacency, and as a result lose the benefit to be derived from a really analytical view of history.

Take the early Nineteen Thirties as an example. From this distance the mechanical aspects of that time certainly appear grotesque; but, when we realize that this was the period when physics was in the throes of conflicting and essentially independent theories, the fact that applications were made at all is remarkable.

We read of the trials of the men of that day and wonder that they could have been apparently content with their mode of life, its discomforts, and its annoyances. Instead, we should admire them for having made the best of a hard situation, and treasure the rugged qualities which they exemplified. It is possible that by taking our minds back, divesting them of their modern knowledge, and then studying these bygone days in an attempt really to appreciate their true worth, we would lose some of our satisfaction with respect to the technical accomplishments of our own generation, and be better prepared for advance. At least it is worth the attempt.

Those were interesting times when the second Roosevelt was elected, and the world was in the midst of the last great economic readjustment. It was a time of transition, evident enough as we now regard it, but perhaps not wholly appreciated at the moment. It was marked by great extremes; the United States were just emerging from the prohibition experiment, and international affairs were chaotic. The system of distribution had nearly broken down, and there was little real control of production. No one really understood the monetary system under which the civilized world then tried to operate, and which was based on the curious process of laboriously digging gold out of one hole in the ground in order equally laboriously to bury it in another. Hence, it is illuminating to review the life of a plain citizen of the period and the nature of his environment.

Consider, for example, a professor in some northern urban university, and let us attempt to appreciate the sort of life he led, with a sympathetic attempt to evaluate the extent to which his efforts were circumscribed by the hardships and discomforts of his daily existence.

It is necessary at the outset to realize that he was in the peculiar position of being regarded by many of his fellow countrymen as of outstanding intellect; while at the same time his scale of living was decidedly middle-class. Yet he had much of comfort, in the way that comfort was then regarded, and undoubtedly he considered himself well off.

He probably owned an automobile, for example, and in this he proceeded from his home to his work. In many ways his car was embryonic, for it was, of course, a relatively new development. To get it under way, he first started the engine turning over while entirely free from any operative connection with the vehicle, and then he had to go through 14 separate motions with his hands and feet before getting the car up to full speed. It seems hard to realize that this situation could have been long tolerated, but actually it persisted for years. Moreover, these motions, of various pedals and a hand lever, had to be carried through in a rigid sequence and with a fairly careful timing of the operations. A clumsiness, such as performing one act out of proper sequence, would spoil the whole affair, and the professor would practically have to start all over. Yet people of all degrees learned this ritual and drove cars everywhere. Nor were these motor cars of the Nineteen-Thirties toys, for in a curious delusion that weight and riding qualities were inseparable, even the better grades of automobiles were built so heavy that they weighed several hundred pounds per passenger, a total weight of as much as 4,000 pounds being not unusual.

E. R. Schwarz

On nearly all highways traffic moved in both directions at the same time! Moreover pedestrians crossed these roads at the same level. There was no drying of streets in the cities, so that they were often wet, and, in extreme weather, covered with ice. Car speeds seldom got above 60 miles per hour, but under conditions which then obtained, there was a carnage and literally tens of thousands were killed yearly in the country. Right in the hearts of cities there were grade intersections of important streets and practically no elevated arteries. The law officer who was often stationed at points where important arteries intersected on a level, and who attempted to regulate traffic by whistling and waving his arms, was often a diverting spectacle. His antics are still recalled with amusement by some of my elderly colleagues. No wonder our professor arrived at work with his nerves somewhat frayed, and that the scientific writings of the time reflect a sort of general nervousness and a haste to publish fragmentary findings.

IT IS hard to suppress untoward amusement and to preserve the sympathetic attitude when one considers the clothing which our professor wore. It was put on in layers, and, while the lower layer was periodically washed, the other layers were often worn practically continuously until they disintegrated, with only infrequent dips into various solvents. In spite of this intentional protection of the top layers from contact with water, they sagged and stretched, and this tendency was ineffectually combated by occasional pressing by a highly heated metal implement. If caught out in the rain — for accidental sprinkling accelerated this process of deformation — the professor would don still another layer called a raincoat, so designed that it drained the water principally into his shoes. These shoes, by the way, were never thoroughly washed or even cleansed with solvents. They were daubed over occasionally with an impermanent varnish, which was given some specular reflection by rubbing with a cloth, but which was not really waterproof. The shoes were of natural leather, close-fitting and entirely unventilated, and fastened in position with lacing cords, which frequently became entangled. The fastening of his clothes generally was by buttons. Even though sleeves did not open, buttons were still retained in position at his wrists, where they were actually quite inconvenient, as a sort of atrophied appendage. He wore a collar about his neck, kept meticulously white by frequent changing, as a sort of obvious presentation of one thoroughly clean portion of clothing. Some of his collars were rendered stiff and irritating by saturation with vegetable starches. They were surrounded by highly colored ornamented bands which he tied in intricate knots and adjusted with careful precision. The lenses, by which his vision was corrected, were wired to his ears, or else held on by pincers which gripped his nose. As his accommodation was faulty, he carried two sets of lenses which he alternated in position on his face, carrying the spare in a little metal box. Some of his colleagues wore both sets of lenses at the same time, made into a combination called bifocals, so that they could produce the effect of changing lenses by tipping the head and inclining the eyeballs. Of course with this arrangement they went about with their feet and the ground in their vicinity in a perpetual haze.

In his office the professor ordinarily found other conditions hardly conducive to logical thought. Right in the midst of his most careful musings, anyone, not merely his chosen friends and colleagues, but literally anyone, could interrupt instantly by calling him on the telephone. A bell would ring in his office and convention demanded that he should immediately cease everything else and answer. There was no provision whatever by which a conversation ensued only when both parties had indicated willingness; even tradesmen in the city could initiate the ordeal. In answering, it was necessary that the professor practically wrap himself up in an instrument. He would hold one gadget to his ear and another to his mouth, and entangled in the connecting wires, proceed to try to talk. Some forms of equipment, then just going out, but strangely enough persisting longest in this country, even required the use of both hands as well as the vocal organs.

The sounds heard over the telephone of the day were recognizable, but hardly natural, for only a fifth of the useful frequency spectrum, or even less, was transmitted. In fact, people habitually listened to radio music in which there was less than one third the spectrum present, although scant enthusiasm for the result has come down to us, except in the amusing and rhapsodic advertising of the times.

Our professor was bound to be fairly uncomfortable for other reasons. His office was heated in winter, of course, but in summer was left to its own devices with the window open to admit the dirt and noise of the city and the hot, humid air. Even in winter, while there might possibly have been some control of air temperature aside from his own chance manual regulation, there certainly was none of humidity. Also the walls of his office, with none too certain thermal insulation from the outside conditions, took up almost any temperature whatever, and the conditions for his bodily radiation varied in a wide and erratic manner. It is strange that these matters were so completely ignored, for they are hardly mentioned in the technical literature of the time, although certainly engineers should have been somewhat conversant with the laws of radiation, if not of biophysics.

Somewhere on the premises of the college there was a heating plant, which probably consisted of simply a coal fire with some distribution medium such as steam. For every thermal unit released by burning coal, there was transmitted into the building actually less than a thermal unit, so that the process was highly inefficient. Thermal pumps were in the early stages of development, and the central stations played little part in the heating of a city except perhaps to operate coal-burning heating plants of their own and sell steam.

Howard Lester

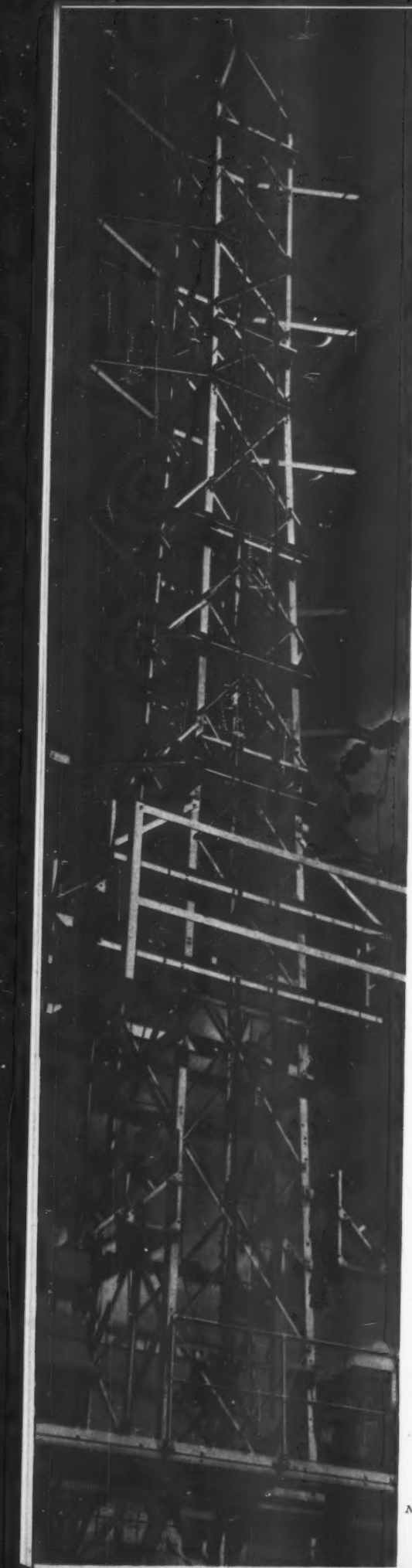
The most striking feature of our professor's day, however, and one which he considered an important part of his work, was the giving of lectures. He would stand up in front of a group of 50 students or so and orally recite a bit of scientific matter, perhaps meanwhile drawing crude diagrams on a large flat black surface with a white crayon. This was done not alone in the presentation of new thoughts and researches, but as a means of imparting well-known information to students. It would not disturb him in the least that a hundred other professors in various parts of the country might be doing exactly the same thing at the same time. It was the custom of the day that he should appear personally for this ceremony, although it would have been possible even then to have prepared a much more finished presentation by vocal cinema, realizing of course that it would not have been stereoscopic and that the articulation might have been a bit crude. Thus a fair fraction of our professor's time was occupied in a rehash of the well-known before large groups, where anything approaching Socratic dialogue was patently impossible. Another amusing feature of these lectures was the so-called taking of notes by the students, who attempted by simple pencil and paper to reproduce important ideas as the affair proceeded. The results were naturally fragmentary, but we must remember that under the then existing system a word once spoken was lost unless recorded in some such manner.

At noon the professor might take a walk, either because of assumed benefit to the functioning of his organic processes, or more likely as a temporary means of escape from the distractions of his office. If the latter incentive was his reason, the attempt was likely to be unsuccessful. The streets were heavy with the odor and smoke which nearby factories poured freely into the air almost without restraint. The price paid by the public for thus distributing unburned fuel on the breeze, and later abstracting it from draperies and clothing, was startling. One statistically-inclined person computed that no less than 70,000,000 tons of soot fell on the country every year, so that all the buildings were soon dingy and the sun was at times obscured.

He would also meet with din and confusion. Electric cars on rails, with hard steel wheels and steel spur gears, were still used for urban traffic. They made so much noise that one could literally be heard a mile away on a still night. Every automobile carried noise-making apparatus, usually in the form of a diaphragm operated by an electric vibrator, ostensibly for the purpose of cautioning pedestrians, although one wonders how an incautious one could have been extant. Automobile engines, burning highly volatile refined hydrocarbons, filled the air with carbon monoxide due to faulty combustion. Worse yet, there was a furor at about this time for the use of admixtures of anti-detonants. These were really useful in view of the nature of the fuel on the market commercially and its complete admission before compression, and a very popular type incidentally consisted of tetraethyl lead. Apparently these exhaust gases did little real harm to the pedestrians, although the data on the point was then incomplete, but the knowledge of their presence in the air was disturbing, at least to the scientifically minded.

An airplane or two may have roared overhead with unmuffled exhausts during this noon-hour walk, for there were quite a few planes in use. The professor probably watched these with a bit of trepidation. In the event of even minor power-plant difficulty they were obliged to land immediately and precipitously at high ground speed. There were no landing spots on buildings, nor could they have been used if present, for the planes of the commercial routes came to the ground while still traveling as much as 60 miles an hour. The slightest fog was a serious matter, for it could not be dissipated, and there was no way in which the pilot of the usual commercial plane could get his position accurately with respect to the field except by visual observation. In order to travel by plane one usually had first to make an intricate automobile trip from the center of the city out to a field in the country, and then, if there were fog or heavy rain, the trips would be cancelled. In spite of all these enormous handicaps a few courageous pioneers operated passenger lines and succeeded in giving acceptable service.

Of course the existing competition in the field of long-distance transportation had its disadvantages. Electrification of railroads had not proceeded far, and it was a common sight to see a great steam locomotive belching smoke and steam, radiating expensive heat units broadcast, and puffing away at its load. The driver leaned out of a side window in the rear, one end of him baked and the other end frozen. When the track curved the right way he could see ahead. In order to start a train — for roller bearings were just appearing on railroad cars — the locomotive would first back up to take up the slack



Nesmith

in couplings, and then go ahead with a great bumping and crashing, much to the discomfort of passengers. Air conditioning was also in its infancy, and the atmosphere in the rear coaches of a train on a hot, dry summer day rocking across the country on uneven wood-ties and an unoiled roadbed may be imagined. The picture is more unattractive if one considers that sanitary arrangements were still somewhat barbarous.

Trains were enormously heavy and when well up to speed required a long distance in which to stop, for brakes were simply pieces of cast iron pressed onto the steel wheels by air pressure. There were many highway crossings at grade, some of them actually without any automatic protection except a bell brought down from the old horse-drawn carriage days and inaudible to an automobile driver except when actually abreast, and not even then in a high wind. The locomotives carried shrieking whistles which blew almost constantly, much to the discomfiture of the countryside, but there were of course many grade crossing accidents.

LUNCH for our professor was a ceremony of a sort. Nearly all the ingredients were of natural origin with very little in the way of synthetics or products of the biological industries. The foods were attractive in their way, but chosen almost at random, and served under circumstances that were somewhat appalling. To the discomforts noted in his office were added in the dining room a complete intermixture of the odors of all the several dishes and usually such incomplete ventilation that a blind man could have told the instant he entered the door of a restaurant. In fact he would not have had to depend upon his olfactory sense, for the dishes were of various glasses and ceramic materials (as well as in some cases the tables themselves), so that there was plenty of noise from the impact of hard materials.

Returning to the office the same hectic round would continue. Perhaps in the afternoon the incessant clatter of typewriters would be especially annoying. For letters were written on typewriters, and there was a great deal of letter writing. That was the only way of practically conveying ideas outside of the archaic telephone and personal visit.

The library, to which our professor probably turned, was enormous. Long banks of shelves contained tons of books, and yet it was supposed to be a working library and not a museum. He had to paw over cards, thumb pages, and delve by the hour. It was time-wasting and exasperating indeed. Many of us well remember the amazing incredulity which greeted the first presentation of the unabridged dictionary on a square foot of film. The idea that one might have the contents of a thousand volumes located in a couple of cubic feet in a desk, so that by depressing a few keys one could have a given page instantly projected before him, was regarded as the wildest sort of fancy. This hesitation about accepting an idea, the basic soundness of which could have been tested by a little arithmetic, is worthy of more than passing notice. For the tenor of the age was to welcome new inventions and theories. In fact the man on the street was wont to visualize scientific triumphs as *fait accompli* even as they were being hatched in the laboratory. He combined a simple credulity on some things, not erased even by the singeing of the Big Bull Market of the late 'Twenties, with a strange resistance to others. It seemed that the greater the technical difficulties which accompanied some really revolutionary proposition, the more casually the ordinary citizen accepted its consummation as being temporarily delayed but a fortnight or so.

Television was a case in point. To read the contemporary popular accounts one would suppose that the basic problem was solved at least once a month for several years. Yet the public seemed not to mind this crying of wolf, and quietly ignored simple analyses which showed that to transmit the image of a man's face in recognizable fashion would require 50 times the amount of communication channel adequate to transmit his voice. And when the progress of television proved to be exceedingly slow (like many other things which in the 'Thirties were asserted to be just around some corner), the layman was positive that the retardation was because of some corporation's machinations.

SOMEHOW the ordinary fellow of the 'Thirties, though he was by no means as witless as he deemed himself when he counted up his stock market losses in the earliest years of the decade, (*Continued on page 146*)

T. J. Foster, National Bridge Works

Left: Cast iron house at No. 1 Lock, Tipton Green, England, probably oldest metal house in existence. Right: Niels Poulson house (1890) under demolition in Brooklyn. Reputed first steel-frame house in the United States. When taken down in 1931, steel work was found in excellent condition

The Quest for a Better House

Can Mass Production Produce a House that Will Be a Home?

By John Burchard, 2d

A Judicial Examination of the Six Basic Methods that Have Been Suggested for Producing Better Houses Cheaper —The Challenge to Industry

PUBLIC attention has recently been aroused over the great commercial potentialities of a housing industry. National magazines, eagerly publicizing something that is not really new, have served to keep us in a ferment. Almost daily we have been asked to gape at some new solution of a very old problem. Serious thinkers have professed to believe, or at least to hope, that this new industry would serve the present economic emergency as others have served similar exigencies in the past.

No one denies that when the big "if" is removed a mighty industry will spring up, but in view of the hysteria, it is well to consider in all seriousness what has been offered the public. The problem has been recognized for many years during which sincere investigators have devoted brains, funds, and lives to the study. Most of these men have been moved by genuine interest in human well-being although some promoters have hoped to "muscle in" on what looked like a racket.

Thus the idea of redesigning the house is no recent concept. What is new is a seriously awakened public interest. Journals have largely confined themselves to representations of inventors' ideas and claims and have been notably loath to indulge in judicial criticism. Unless we stop to think pretty soon, we are getting ready for a terrific morning after.

In this paper, therefore, I shall try to set forth clearly and concisely, and I hope fairly, the various basic approaches so far made to the industry of house building. I shall confine myself to the structural methods urged. I shall illustrate the types and discuss what seems to be the outstanding example of each type. The reader will understand that there have been numerous variants of each idea, but these have been only in details of such trivial nature as not to upset broad conclusions concerning the general approach.

It must be recognized that there are many problems besides that of building the house. But granting a solution of all the financial, labor, and social difficulties, it is still apparent that a new sort of house must be produced in order to permit real industrialization.

At the outset we may as well forget the oft-quoted example of the automobile industry which is comparable with the potential housing business in almost no essential respect. A house is not portable, it cannot be shipped to the site in a crate ready to operate, it represents the largest single expenditure a man ever makes and one that really drains his resources, and worst of all it is hemmed in by traditions by no means all of which may desirably be discarded. The man who first offered the public a horseless carriage could safely say, "All right, if you don't like it, stick to your horse." This threat falls flat in housing. The Elizabethan or Colonial house is a pretty good article and in many respects superior to any

T. J. Foster, National Bridge Works

French house originated by Société de Constructions Metalliques Fillod. Inner and outer walls are of steel sheets

Grosvenor Atterbury's concrete slab houses at Forest Hills Gardens, L. I. Upper left: Exterior appearance of factory-made houses erected in 1920. Above: 40-foot electric crane on railroad tracks lifting slabs into position. Left: Interior showing paneled walls without lath, plaster, or wood trim, painted only after erection (1913).
See page 131

new creation yet proposed. The chief appeal our captains of the new industry must make is to the pocketbook.

In order to have a common basis of comparison we will admit the thesis of mass production, for this is postulated in all the proposals. We may examine, then, the criteria to which any successful plan will have to measure. They are:

1. Is the system susceptible of almost universal application, regardless of site and climatic conditions? Unusual roofs, cellarless houses, houses without heating plants, will not do. Making such economies dodges the problem. The house must be easily constructed on rolling land or on the flat, in city and country, over ledge or sand.

2. Can the parts of the house be made repetitively? This is the essential of mass production. It demands that there be relatively few types.

3. Are these parts of a unit type permitting a wide flexibility of plan and elevation to meet a widely varying demand? This is a very necessary and desirable concession to individuality.

4. Do the parts lend themselves to rapid assembly and early occupancy? Can they be put together simply and without any unusual equipment? Cranes and the like involve too much capital tie-up on the part of the assembling company.

5. Are the parts light enough to be shipped widely? Unless relatively few plants can make the houses, mass production will not be achieved.

6. Do these parts when assembled produce anything more than structure? An economy of twenty per cent in bare structure will produce the trivial saving of five per cent in the final price to the buyer.

7. If finish is incorporated in the plan, is it of a type and quality acceptable to the buyer?

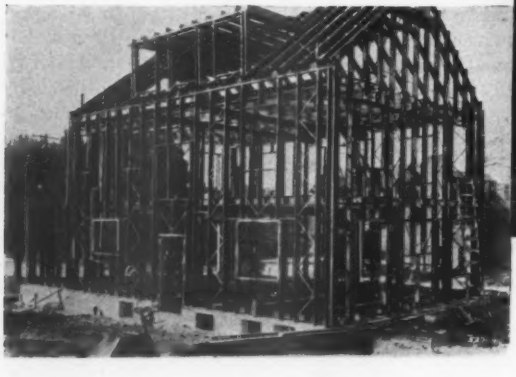
8. Does the construction make a real effort to provide for accessories in such a way as to eliminate later cutting and fitting?

9. Will the completed house be dry, easy and economical to heat in winter, cool in summer, will it shed snow and reflect the burning rays of the desert sun?

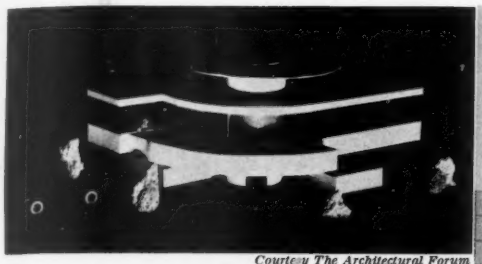
10. Does the system make any effort to cope with tradition? It is all very well to plan what is good for people but very hard to make them buy it. I still like the snap of fall, the fresh dampness of spring, the smell of a badly burning log, and so do you, air conditioning or no air conditioning.

11. Perhaps most important of all, is the house actually cheaper for what is offered? It is much easier to sell a comparable article for less money than a better article for the same money.

With these criteria in mind we may now turn to the six basic approaches which have so far been widely publicized. In approximate chronological order they are: houses of pre-cut wood, of poured concrete, of pre-cast

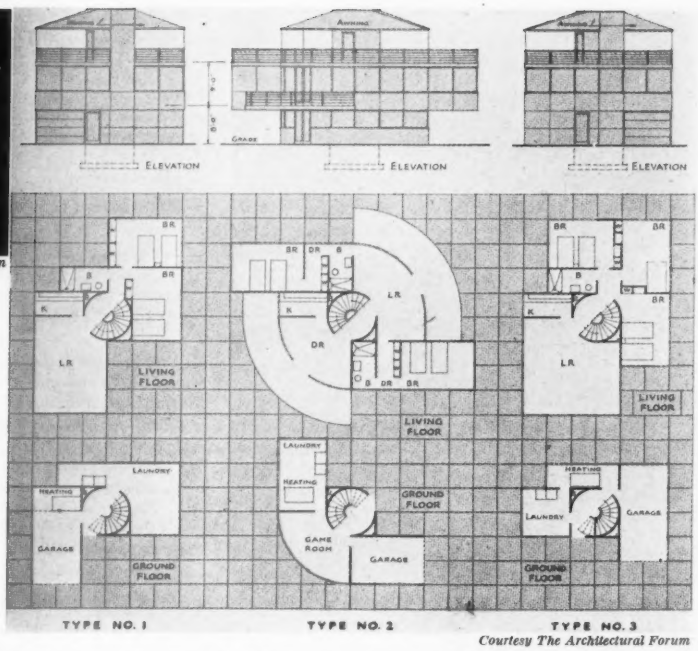


Left: House designed by Steel Frame House Company, Pittsburgh. Above: Porcelain enameled house built by Ferro Enamel Corporation, Cleveland, and designed by Charles Bacon Rowley '12 and Meade A. Spencer '21. The house has a steel frame and its total erection time was half that required for conventional materials. Susceptible to mass production



Courtesy The Architectural Forum

Above: Model of a house for shop fabrication, designed by Bowman Brothers for a family of two adults and two children, having an income of approximately $3,500 a year. Right: Front elevations and floor plans of three types, ranging in cost from $4,000 to $6,000. *See page 154*



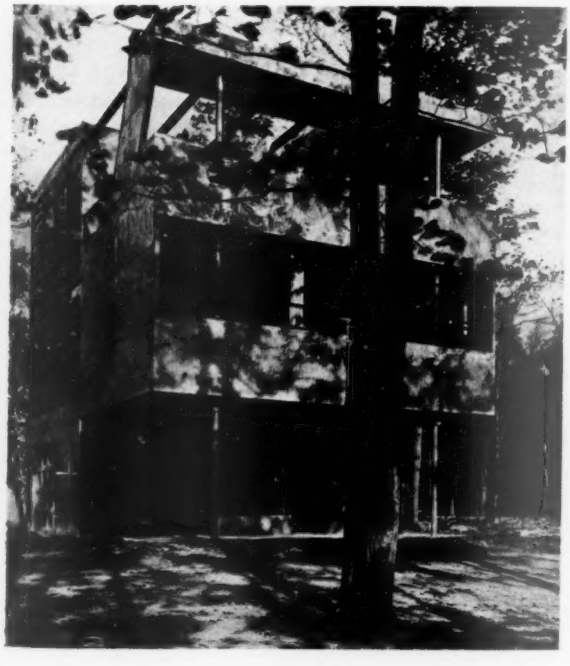
Courtesy The Architectural Forum

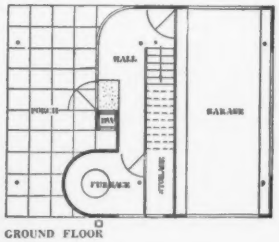
concrete, of steel frame, of metal panels, and finally houses of radically different principles of design and construction based on replacement of the compressive principle by the suspensive.

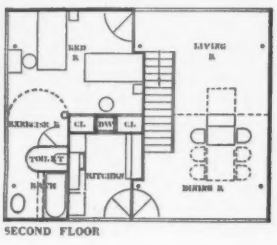
Pre-Cut Houses

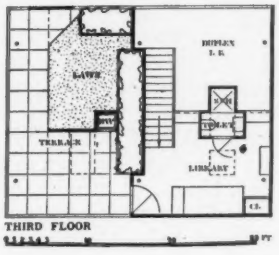
It is quite natural that the earliest attempts at industrial housing in this country should have been efforts to build a house just like the one to which everybody was accustomed, i.e., of wood. To do this the house was planned in advance, the timbers were cut to proper length and stored until sold. Cutting and fitting on the job were supposed to be eliminated. Although the actual efforts all pre-supposed a few standard types of houses, it is possible that some standard basis of planning might have eliminated this difficulty. Another serious trouble lay in the fact that wood is easily cut or shaped by anybody with a saw or chisel. Every artisan has the boyish urge to cut the nearest timber rather than spend time looking for the one that he ought to use. Perhaps careful routing and planning of a kind rather inconsistent with the erection of a small house might obviate this difficulty. It is not fundamental but it certainly is pertinent.

The principal difficulty with the pre-cut house lies in the properties of lumber which, with changing humidity, expands or contracts in different degree along and across the grain. Thus the parts of the house have a way of being the wrong size when they come to be used. Until some intelligent chemist develops a cheap way of treating timber to retain all its desirable properties while rendering it practically constant in dimension, there is small chance for the pre-cut house. Finally, after the structure has been put together, the finishing work



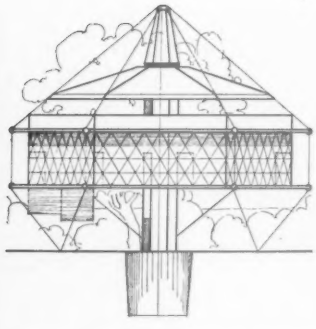


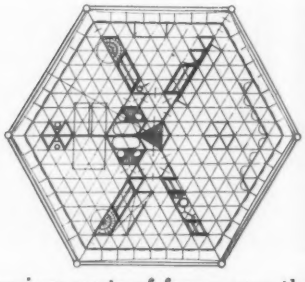




"Aluminaire" house designed by A. L. Kocher '13 and Albert Frey. Photograph shows west elevation as the house is erected at Syosset, L. I. The large glass area, two stories in height, admits light to a duplex living room. Drawings show plans of the three floors. *See page 156*

F. S. Lincoln, '22





R. Buckminster Fuller and his Dymaxion hotel (photograph) and elevation and plan of his Dymaxion house. The house, designed for mass production, is 40 feet high and 50 feet in diameter. It contains two bedrooms, with a bath, living room, and service unit. Mr. Fuller estimates that the house could be assembled within a day, that the material weighs approximately three tons. *See page 156*

required is quite comparable with that in the traditional structure. Pre-cut houses might with sufficient planning measure fairly closely to the rest of the criteria. Up to date a skillful local carpenter, given complete and trusting charge, can usually knock up a comparable structure at less cost than the pre-cut house. Panels made with lumber as a basis fall in the same category as the pre-cut house.

Poured Concrete

The best minds were early fascinated by concrete. This material, sweeping into large construction, revolutionized engineering methods. Naturally, many people thought it ought also to revolutionize house construction. The first major efforts contemplated a system of prefabricated, standardized forms which would be used over and over again. No scheme of this sort was more completely developed than that of Thomas Edison which was widely acclaimed. Edison provided cast-iron forms, so constructed as to provide moulds not only for the shell of the house but for stairs, mantels and even a bathtub. Unkind rumor relates that when the proud inventor entered his first house he found something had gone wrong and the bathtub was filled with concrete. After the concrete had set the forms were removed and but little finishing was supposed to be required. The house was completed merely by placing windows, heating plant, and accessories. The Edison scheme proposed six different types of forms to avoid monotony.

The difficulties with the approach were many and almost self-evident. It is easy to say standardized forms and easy to design the typical panel, but the complete set must take care of corners, three- and four-way wall intersections, framing of doors and windows. The routing of the forms into an isolated house is a major operation. Like most of the other proposals, standard forms may effect economies when one thousand like houses are to be erected on the same site. When it comes to shipping various parts of forms over the country, the gigantic requirements of the planning become more significant.

In this approach there is no repetitive production of house parts. Wide flexibility of plan and elevation are not attainable unless such a multiplicity of various form types are provided as to invalidate the whole idea. Rapid assembly is not possible nor early occupancy because concrete takes a long time to dry out. Forms that can be used very many times are so heavy as to preclude distant shipment and this is also impracticable in view of the capital tie-up during transportation. The finish of such a house is not of a type and quality anybody wants unless additional expense is incurred. If installation of accessories is to be provided, still more types of forms are required. Concrete is a bad insulator, it tends to leak unless an unsightly membrane waterproofing is applied. Finally, the cost has so far been high. In general this is not a fair criticism because a system designed for mass production might well cost a great deal when mass production was not applied. But Edison had resources and backing and the failure of his houses to come anywhere near the low cost he anticipated is in this case significant.

Improvements were made in later proposals. Ernest Flagg of New York developed some beautiful poured houses in Dongan Hills, Staten Island. He solved the finish problem by setting flat stone inside the form shutters and leaving them as the wall facing. The stone was cheap only locally and in most other respects the Flagg house failed to meet any of the criteria by which the Edison house had also failed. Local costs were low, but attempts with the same house in other communities were not so favorable.

Finally, the form difficulties were done away with by providing self-forming blocks. A characteristic treatment of this sort was the "Stockade" system of James Monroe Hewlett, who used a set of small blocks of excelsior and binder, each with two vertical cores. The blocks were set dry with staggered joints and the cores, in register, were filled with concrete. Provision was made for reinforcement and girts. These blocks could be made on a large scale. They were light enough to ship easily. The wall was built fairly rapidly. But when all was done the Stockade house was still innocent of exterior or interior finish and the drying out of concrete was still a problem. This system was tried out widely. It was as

fair a test of the self-forming block as could be imagined. Because of its abandonment we may safely conclude that the pouring of concrete houses is not a solution of the problem.

Pre-Cast Concrete

Hewlett had progressed far enough so that his only major difficulties, measured by my criteria, were the drying out of concrete and the failure to provide finish. Prior to this advance in the poured-concrete house, other investigators, recognizing the difficulties enumerated but still interested in concrete, decided to avoid them by pre-casting the units. These investigators are still legion. They are resourceful. Nearly every week the *Official Gazette* of the United States Patent Office carries vivid evidence of the tragic number of people who patent some new type of self-keying concrete slab. All are apparently engaged in a wild-goose chase. Slabs are seldom universal or flexible in application. Single layers encounter joint problems that have never satisfactorily been solved. Double layers have, up to the present time, shown no promise of economy. But the self-keying slab is perhaps the hardiest perennial of all the multifold ideas in this field.

Far more significant than these whittlings at the problem, usually by individuals without adequate resources, was the imposing effort of Grosvenor Atterbury (see page 128). This prominent architect, despite repeated failure to bring costs down, still apparently has firm faith in the soundness of his basic idea, which contemplates casting concrete into large, rectangular, grooved slabs and putting the finished slabs in place with a derrick. Window and door frames are also of concrete. Simon Lake, the famous inventor of the submarine, has also played with a similar thought but his slabs were even larger than Atterbury's, often attaining the dimensions of the entire side of a room or building. Both men have built numbers of houses at what is reported to be great cost.

Now this dinosaurian approach fails to meet many of my criteria, but one or two points are so significant as to make mention of the rest unnecessary. The larger the unit, the less the flexibility of design and plan, unless a tremendous number of types is provided. The bulk of the individual sections precludes shipment to any considerable distance and dictates a large number of plants, probably one within every hundred-mile radius. The tie-up of the forms in the plant is quite as serious an obstacle to the mass production of the panels, as, on the site, it is to early occupancy. This, together with the small size of the numerous plants, seems to prevent any real economy in manufacture. The requirement for a derrick cuts out the rural market and the old problem of joints rises to plague the inventor. The time of erection of the Atterbury house seems to have been short.

Steel Frames

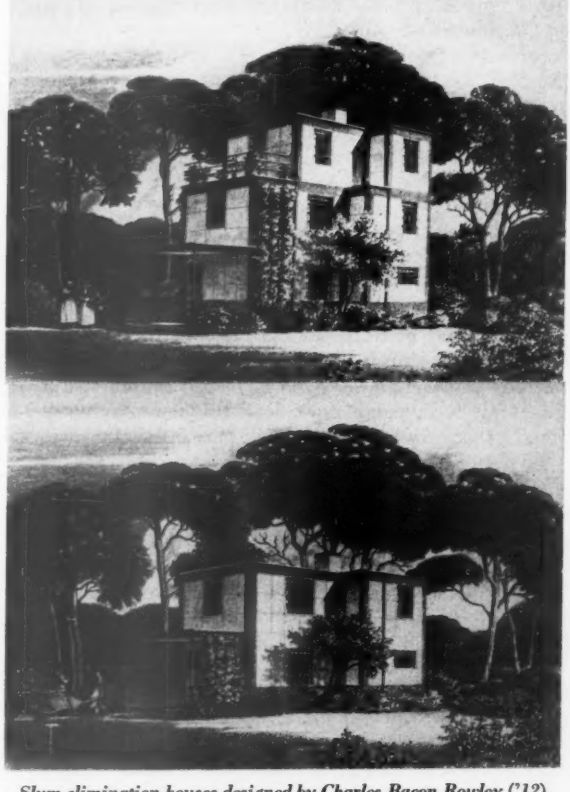
a. *As a substitute for wood*

The pre-cut lumber idea does not die easily. Many people seem to have thought that the only difficulty with this approach lay in the inconstancy of wood. Following this thought to its logical conclusion, they have naturally turned to steel, which does not change dimension appreciably and which moreover cannot be readily cut by the ambitious erector.

The earliest steel-frame house in this country, built by Niels Poulson in Brooklyn in 1890 (see page 127), was not a significant contribution and may be dismissed as an historical item. The serious later workers may be definitely reproached for their lack of ingenuity. They fell readily into two schools: those who replaced the wood of the traditional house with steel and those who copied the apparent principle of skyscraper construction.

No concern carried the first idea further than the Steel Frame House Company of Pittsburgh, a subsidiary of a large steel company, in turn a subsidiary of one of the greatest units in the steel industry. This house was carefully studied and widely advertised, and mass production was apparently applied in creating a large inventory of parts (see page 128).

A small channel was adopted as the standard member and this was punched in both flanges and web at two-inch spacings. Used as studs the channels were set at normal two-foot intervals. Thus a frame exactly like a wood frame was provided, including roof framing. There was no attempt to depart from tradition in planning. The company intended to (*Continued on page 153*)



Slum elimination houses designed by Charles Bacon Rowley ('12) and Associates, Inc., Cleveland. Three units have been worked out which, with various combinations and arrangements on Cleveland city blocks, allow 44 houses where there are now 30, at the same time making available more light and area to each family

The Drive for Higher Standards in

An Account, Prepared by the Staff of The Technology Review, of the Moves to Promote Higher Standards of Education and Practice Among Engineers. — The Program of the Engineers' Council for Professional Development

ONE of the most significant moves yet made to enhance the professional status of the American engineer was the organization last October of the Engineers' Council for Professional Development (ECPD) of which C. F. Hirshfeld, chief of the research department of the Detroit Edison Company, is chairman. This council, representing seven national engineering bodies, "aims to coördinate and promote efforts and aspirations directed toward higher professional standards of education and practice, greater solidarity of the profession, and greater effectiveness in dealing with technical, social and economic problems." It has for "an immediate objective, now apparently practicable of attainment, . . . the development of a system whereby the progress of the young engineer toward professional standing can be recognized by the public, by the profession, and by the man himself, through the development of technical and other qualifications which will enable him to meet minimum professional standards."

That these proposals are something more than preamble rhetoric was attested by ECPD's decision at a meeting on November 30 to formulate "criteria for colleges of engineering which will ensure to their graduates a sound educational background for practicing the engineering profession," and to sponsor "methods whereby those engineers who have met suitable standards may receive corresponding professional recognition," either by governmental licensure or other agencies.

To perform these particular functions will be the duty of two standing committees, one on "Engineering Schools" with President Karl T. Compton as chairman, and another on "Professional Recognition" with Conrad N. Lauer, Vice President of the United Gas Improvement Company of Philadelphia, and former President of the American Society of Mechanical Engineers, as chairman.

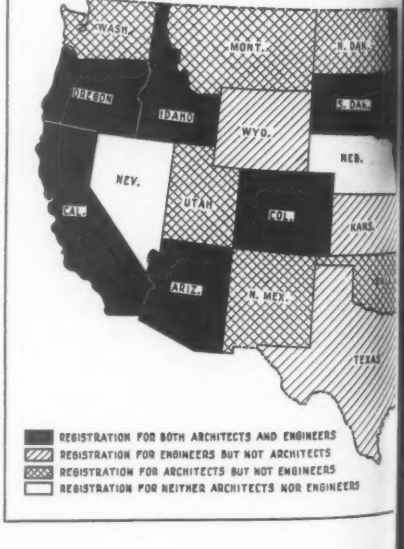
ECPD conceives the process by which professional engineers attain full status as divisible into four stages: recruitment of the raw material, its formal educational processing in the colleges, its further processing through experience following graduation, and its final stamp of approval by some inspecting authority. The second and fourth stages are within the province of the Compton and Lauer committees, while the first and third stages are assigned to standing committees on "Student Selection and Guidance" and "Professional Training," chairmanned by Harrison P. Eddy of Metcalf and Eddy and General Robert I. Rees of the American Telephone and Telegraph Company, respectively.

If further indication of ECPD's potential powers be in order the names of the seven national bodies whose prestige and influence are marshalled to its support will suffice: American Society of Civil Engineers (ASCE), American Institute of Mining and Metallurgical Engineers (AIMME), American Society of Mechanical Engineers (ASME), American Institute of Electrical Engineers (AIEE), American Institute of Chemical Engineers (AIChE), Society for the Promotion of Engineering Education (SPEE), and National Council of State Boards of Engineering Examiners (NCSBEE).

In pursuing the course of action it has undertaken, ECPD takes cognizance of the growing importance and responsibility of the engineer, and of the consequent necessity, if the public weal is to be conserved, that there be established satisfactory means for testing his *bona fides* and for encouraging him further to develop his professional capacities. In considering ECPD's program, it is instructive to examine the courses followed in elevating the standards of the practitioners of medicine and law.

THE first medical school in North America was that organized in 1765 at the College of Philadelphia, now the University of Pennsylvania. By 1800 there were five such schools in the United States, when the country had a total population of five and a half million people. In the following hundred years medical schools increased more rapidly than the rate of population growth, reaching a situation shortly after 1900 when there was one for every half million inhabitants.

Thomas Jefferson, among his many other activities, is to be credited with initiating legal instruction in the Colonies by his reorganization of his alma mater, the College of William and Mary, in 1779. Law soon had a place in other university curricula — at the College of Philadelphia beginning in 1790, at Columbia in 1794, at Transylvania in 1799, and at Harvard in 1817. None, except Harvard, has had an uninterrupted existence.



By way of comparison, the first formal

rds in the Engineering Profession

teaching of engineering in the United States was probably that given at West Point beginning in 1817, while Rensselaer Polytechnic Institute at Troy became the first civilian engineering school in 1824, except for the short-lived Gardiner (Maine) Lyceum which preceded it by two years. In 1845 Union College at Schenectady had a department of civil engineering, and the Lawrence (Harvard) and Sheffield (Yale) Scientific Schools were founded in 1847, in which year the University of Michigan also began instruction in civil engineering. Four years later, in 1851, came the Chandler Scientific School at Dartmouth. Michigan broadened its engineering program in 1852, and, in 1861, William Barton Rogers founded the Massachusetts Institute of Technology although classroom instruction, delayed by the Civil War, did not begin until 1865. It is clear, therefore, that medicine and law in this country were several laps ahead of engineering with respect to formal academic instruction.

So far as governmental recognition is concerned, they preceded engineering even more markedly. Virginia, in 1639, passed the first law regulating the practice of medicine, Massachusetts followed in 1649, and New York and New Jersey in 1665. Today every state in the Union, of course, has this type of legislation on its statute books and all modern medical practice acts provide for a system of licensing physicians, prescribe certain academic and professional qualifications. and specify causes and means for the revocation of a license.

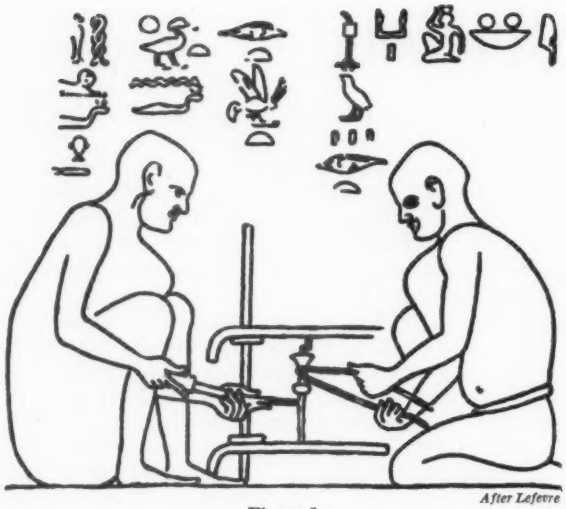
Since the practice of law is a public function, and since our legal system was patterned on that of England, it was but natural that our courts from earliest times were, in most instances, legislatively invested with the power to determine who should be admitted to practice. The reason for this attitude on the part of the governing authority was well summed up in two sentences in the *Bulletin* of the Carnegie Foundation for the Advancement of Teaching entitled *Training for the Public Profession of Law*, "Practicing lawyers do not merely render to the community a social service, which the community is interested in having them render well. They are a part of the governing mechanism of the state."

STATES HAVING REGISTRATION LAWS FOR ARCHITECTS AND ENGINEERS

Even in the days of the earliest permanent settlements along the Atlantic seaboard, engineers, because of their duties in surveying land, were justified in thinking they had some right to be considered a "part of the governing mechanism of the state." It remained, however, for Charles A. Beard and William Beard, '28, in *The American Leviathan* to present a detailed statement of technology's part in government. In a collateral article in The Technology Review for January, 1931, these authors pointed out that the "very advances in science and machinery that have so markedly revamped the society in which we live have inevitably induced a parallel technological drive in government . . . which has enormously increased the duties discharged by the State in every direction, raising the number of employees from the thousands to the millions, drafting into service all the arts and sciences known to man and making use of all the materials listed under physics and chemistry. In many cases this extension is the result of realistic pressures exerted by groups formed around the new devices of technology themselves — the regulation of railways, telephones, telegraphs, cables, steamships, and electric power serving as an illustration."

Hence, it is passing strange that no state took steps to license engineers until Wyoming enacted such a law in 1907, although architects were licensed in Illinois as early as 1897. Louisiana followed Wyoming after a year by requiring civil engineers to register and seven states in all had some provision for licensing one or all branches of engineering by 1920. Now over half of the 48 states, covering 55% of the area of the country and 65% of its population, insist that some, or all, of those who wish to practice engineering professionally may do so only after complying with legal licensing measures. In a few cases the law covers only one branch of engineering as in Louisiana, California and Wisconsin civil engineers, and in Illinois structural engineers. But, in 21 states there are laws embracing all branches of professional engineering. For purposes of record, it is of interest to note that 33 states now have registration laws for architects. The adjacent map indicates where registration laws for engineers and architects are now in force.

Government, by officially recognizing members of a profession, protects those whom it licenses to practice from indiscriminate competition by the unqualified or semi-qualified. Such insurance operates to raise the standards for admission to the profession, and makes those already admitted ever conscious that, in order to preserve and maintain their status, they must endeavor by study and research to keep abreast of the progress of the profession, and, if possible, to contribute to that advancement. At the same time it compels allegiance to a definite code of professional ethics. All this immeasurably strengthens the position of the professional societies and schools. It is, therefore, pertinent to consider briefly the parts played by practitioners of medicine, law and engineering in the enhancement of their respective professions through their principal national societies, especially as those societies have influenced the schools. (*Continued on page 149*)



After Lefevre

Figure 1

The oldest known representation of a lathe. From a relief on the tomb of Petosiris, circa 300 B.C.

The Origin of the Lathe

How the Peculiar Descriptive Geometry of Ancient Egypt Long Obscured Important Evidence of the Lathe's Parentage

By L. L. Thwing

IN THE progress and development of the mechanical arts the drill and the lathe are tools of basic importance. No machinery or structures are built without drilling, boring or punching holes, and a mechanical device without one or more cylindrical parts is a rarity. Wherever there is rotation, a round hole and a shaft or other rotating part to fit it are required and the number of machines without revolving parts is negligible.

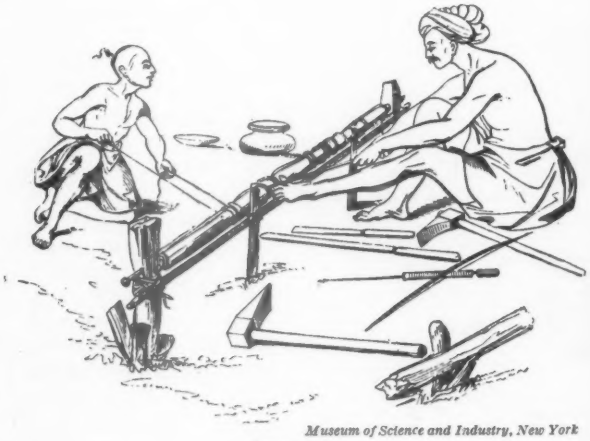
The drill was probably the first special purpose tool developed by man and its history stretches back into the stone age. We know this because many drilled beads, axes, and bannerstones have been found, some of them so hard that they cannot be scratched by the hardest steel. The lathe, however, is a device of comparatively recent origin, but even so it is much older than Pliny and older than the Greek writers from whom he quotes, as its invention is attributed by them to Daedalus, which indicates that even as far back as the Second Century, B.C., its origin was mythical rather than historical. There can be no doubt that the lathe was known to early classical philosophers and engineers, as turned work and lathes are mentioned by Ctesibius, Diodorus Siculus, and others. It seems probable, therefore, that the lathe was known in Greece as early as the Fourth Century, B.C., at which time the arts were very highly developed.

It is commonly believed that the lathe developed from the potter's wheel which was used in Egypt 5,000 years ago. A potter's wheel is essentially a circular platform revolving on a vertical axis. At first it was turned by hand — the so-called "slow wheel" — but later another disc was added to the lower end of the axis and was rotated by pushing it with the foot. With the exception of the drill, this is the oldest rotating device known and there may be some basis for the potter's-wheel theory, but a comparison of the nature of the work performed on the potter's wheel and the lathe indicates that they have little in common mechanically except the revolving shaft.

The potter uses but little force to form hollow ware of soft clay — indeed too much would be disastrous. Considerable force and speed are needed, however, to turn a piece of wood in a lathe, and it is evident that the method of driving a potter's wheel is not adapted to work requiring much power. On the other hand, powerful driving methods for drills were well developed when the pyramids were built, as we find holes as large as four inches in diameter that were drilled with revolving core drills. The driving method was doubtless the same as that described by Homer about 900 B.C. The method of drilling ship's timbers described in the Odyssey is as follows: "When a man bores a wooden plank with an auger, having bound it round on each side with a leathern thong, so that the auger moves and constantly runs around. . . ."

To reconstruct this scene is not difficult as similar methods are still in use among primitive people. One man held the drill, which was a three-foot shaft with a cutting tool of flint or bronze at the lower end. A thong was wrapped once or twice around the shaft and a second man took an end in each hand and pulled them alternately back and forth, rotating the drill first in one direction and then the other. The upper end of the drill revolved in a stone socket held in the driller's hands.

Any theory that the lathe developed from the drill has been only a theory until recently, when fairly conclusive evidence has been discovered to substantiate it.



Museum of Science and Industry, New York

Figure 2

Sketch of wood lathe of a primitive type as used in India

This evidence is a relief from the tomb of Petosiris showing an Egyptian wood turner, his lathe and his assistant, dating from about 300 B.C. (See Figure 1.) At first glance there is little here to suggest that the simple device shown is a lathe, in fact it looks more like a drill but the ancient Egyptian perspective is deceptive. The Egyptians were careful to show the correct technical details of any operation depicted in a mural painting, relief or tomb model. There is ample evidence of this. One result of this desire for accuracy was the practice of showing horizontal objects in a vertical plane. Consequently, we have combined plan and elevation which actually gives more detailed information than any other single picture or relief could do. Modern draftsmen make a separate drawing for each view. The Egyptians combined them. Here the lathe is shown in a vertical plane although actually the two cane-shaped pieces were thrust down into the ground and the long tool-rest and lathe-spindle were horizontal.

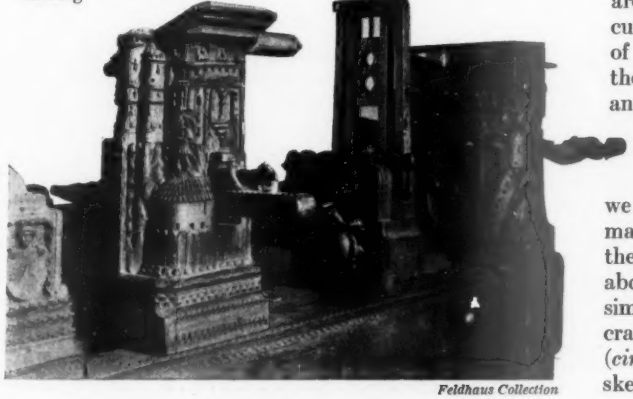
The method of operating this lathe is as follows: The wood for the piece to be turned is cut to length and roughly rounded with an axe or knife. The two cane-shaped pieces (the head and foot stocks) are thrust down into the ground at just the proper distances so that they can be sprung apart and the piece to be turned held between the centers or sockets. The tool rest is then lashed to the uprights clamping the work firmly between the centers. In this case, a spool has been driven onto the work to increase the driving power of the cord and to keep it from slipping sideways. The turner rests the back of his left hand on the tool support and holds the cutting tool as shown. The fact that the tool is shown held in a long handle is evidence that the artist had seen such craftsmen at work, as turning tools even today are twice as long as similar hand tools.

It is interesting to note that lathes of this exact pattern are still used in Egypt and India. (See Figure 2.) Holtzapffel describes the operation as follows:

"When any portion of household furniture has to be turned, the wood turner is sent for; he comes with all his outfit and establishes himself for the occasion at the very door of his employer. He commences by digging two holes in the ground at a distance suitable to the length of the work, and in these fixes two short wooden posts, securing them as strongly as he can by ramming the earth and driving in wedges and stones around them. The centers, scarcely more than round nails or spikes, are driven through the posts at about eight inches from the ground, and a wooden rod for the support of the tools is either nailed to the posts or tied to them by a piece of cocoa-nut rope. The bar, if long, is additionally supported as represented, by being tied to one or two vertical sticks driven into the ground. During most of his mechanical operations the Indian workman is seated on the ground, hence the small elevation of the axis of his lathe. The boy, who gives motion to the work, sits or kneels on the other side of it holding the ends of the cord wrapped around it in his hands, pulling them alternately; the cutting being restricted to one half of the motion, that of the work towards the tool. The turning tools of the Indian are almost confined to the chisel and gouge and their handles are long enough to suit his distant position, while he guides their cutting edges by his toes."

Figure 3

The oldest lathe in existence. Once the property of Emperor Maximilian I, it dates from 1500. Note its remarkable carving



Feldhaus Collection

Museum of Science and Industry, New York

Figure 4

Seventeenth Century drawing of a lathe from van Vliet. Rotary motion was obtained by a combination of spring pole and treadle

After the fall of Rome and during the Dark Ages we have few traces of the lathe, but such an important machine would not be lost and forgotten. Theophilus, the monk, in his "Schedula Diversarum Artium," written about 1100 A.D., mentions turned work and describes a simple lathe for finishing bells. This was revolved by a crank on the end of the work spindle. Leonardo da Vinci (*circa* 1500) was evidently familiar with lathes as he sketched the first known lathe (*Concluded on page 144*)

THE TREND OF AFFAIRS

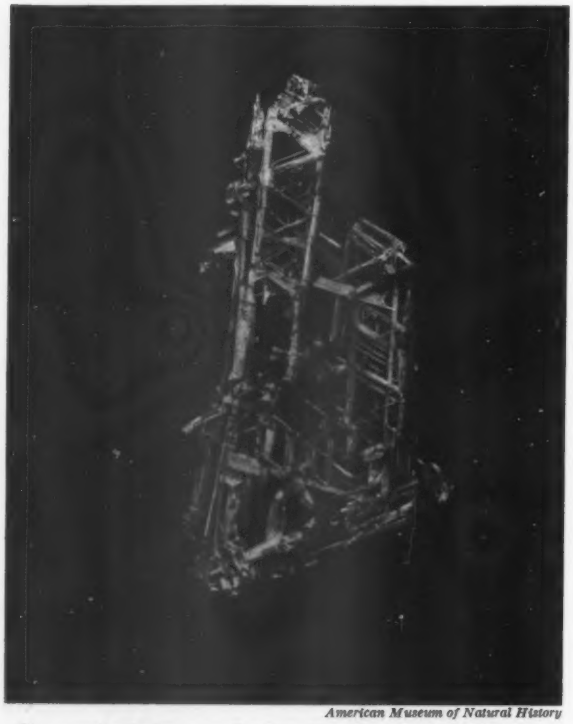
IN THIS SECTION: *Copper Available in Thin Sheets (136); How Do Bats See in the Dark? (137); Tough Glass (137); Radium from Canada (138); Italian Engineering (139)*

Gems That Harden Copper

METALLURGY during the past year has devised (1) a new copper alloy which is said to be as hard as iron and as strong as steel, and (2) an electrolytic method for producing copper in extremely thin sheets.

To appreciate fully the significance of the new beryllium-copper alloy, it is necessary to turn back two years to the awakening of industrial interest in beryllium, the metal of the beryl and the emerald, which is acid-resistant, lighter than aluminum, and tougher than mild steel. Its value as an important metal for alloys was indicated, but the process of extraction with small recoveries from large quantities of low-grade ore was very expensive. Commercial production, still expensive, has been amply justified, however, in the making of a number of alloys, notably the new one with copper.

In this new alloy a degree of hardness hitherto unattainable in copper is produced by the addition of from one to two and one-half per cent of beryllium. Because the amount of beryllium required is so small the alloy offers no price obstacle to commercial development for a wide field of usefulness.



American Museum of Natural History

Not a steel ruin but crystals of cerussite from Broken Hill, New South Wales. It is a mineral consisting of lead carbonate and it crystallizes in the orthorhombic system shown

Tools made of the alloy do not spark, a characteristic of vital importance in certain industries, including gas and petroleum production. The metal has an elastic limit of 170,000 pounds per square inch, and is said to be highly resistant to abrasion and fatigue. It does not corrode and is not affected by superheated steam, advantages which suggest its usefulness for many purposes. It likewise seems well adapted as a bearing and bushing metal.

Copper in thin sheets is being produced by a new electrolytic method in which the metal is deposited on a revolving drum from which it is stripped in sheets of any desired length and in widths up to 50 inches. The sheets weigh one ounce to the square foot. The application of copper in this form seems to have no arbitrary limitations in the field of thin metal sheets and foils. Its beauty suggests its use in architecture and for interior decoration, possibly as wall coverings. It has already been considered as a roofing material when laid on a backing of fabric, and may also be used for awnings and automobile tops.

These new triumphs of the metallurgical laboratories further advance the importance of copper, which bids fair to equal iron and steel in a constantly expanding field of service.

ALTHOUGH metallurgists long ago were convinced that ancient workers in metal had no secret process for "tempering" or hardening copper, that old ghost of fancy still stalks through discussions of copper and its alloys. Any unusual qualities of hardness the ancients were able to impart to their copper was attained by no more profound secret than natural alloys and patient hammering. Metals, such as tin and iron, which could not then be removed from copper, contributed in making natural alloys of considerable hardness.

The legend of tempered copper is said to go back to Tubal Cain with whom the reputedly secret metallurgical process died. In the light of present knowledge, Cain's only secret was a strong arm and a sturdy implement for hammering his metal.

The natural beauty and warmth of copper, coupled with the fact that it was the metal most readily available in ages past, no doubt gave substance to stories of tempering.

It seems fairly well established that men of the Neolithic Age first discovered metals. Possibly their fires, built by chance on an outcrop of ore, melted the metal and inspired its use for implements of peace and war. Copper spear heads, hatchets, knives, and bowls found

by archæologists usually are made of pure copper or an alloy of copper and tin, which is known as "true bronze." These early alloys contained impurities now eliminated by modern methods of refining. Analysis has shown some of this metal was composed of 80% or more copper and up to 18% tin, with traces of antimony, nickel, lead, arsenic, silver, iron, and sulphur.

Men of the so-called Bronze Age are believed to have melted their metals in rock cavities in which the presence of tin contributed qualities of hardness. It was the custom in making cutting instruments to hammer the edges only, no attempt being made to harden the whole implement. The ancients, therefore, produced hard copper by hammering or by accidental alloying. They did not temper the metal because copper by its very nature cannot be tempered. Thus a ghost is laid.

Brubaker

Longview, Wash., lumber town on the Columbia River. Note its carefully laid out, geometrical plan

Infrared's Artful Aid

ON SOME days it is easy to see clearly the prospect serene of the distant hills, and on others the atmosphere is murky. The short waves of visible light are reflected and dispersed by the small particles, mist, smoke, or dust, with which the air is laden. Yet the objects give out or reflect an infrared radiation which consists of longer waves capable of getting past the small particles, and these waves reach us — but we are unequipped with any sensitive apparatus for apprehending them. When they come in large amounts, we know them well enough — they strike us as a blast of heat — but, in small amounts, they leave us cold.

As recorded in The Review last January, the research laboratory of the Eastman Kodak Company, through the work of Dr. C. E. K. Mees, has developed a film which is sensitive to infrared rays and will photograph objects which are hidden from sight by "darkness" or by fog. It will be recalled that Captain A. W. Stevens, of the U. S. Army Air Corps, using infrared light, has photographed Mt. Rainier from a distance of 227 miles and Mt. Aconcagua in South America from a distance of 310 miles. This latter photograph showed the curvature of the earth.

The new film will be of use in astronomy, and, for obvious and practical reasons, in aviation, meteorology, and in warfare if occasion arises. It will perhaps be of service in physiology and medicine. By supplying us in effect with another sense, it may lead to the observation of new and hitherto unsuspected phenomena.

Fabre, who observed the amazing activity which young spiders maintain long after they have emerged from the egg while apparently without nourishment, put forward in all seriousness the remarkable hypothesis that the little spiderlings are capable of converting the sun's heat directly into work without the intermediate agency of food. Why not? he argued, for the food gets its energy from the sun anyway. So — to consider another hypothesis — we wonder whether bats and owls which fly about with perfect assurance in a blackness like the blackness of the Pit, and from the blackness snatch tiny insects, the merest motes, yet never blunder into collision with the branches of trees — we wonder whether these animals may not be equipped by nature for the direct apprehension of infrared radiation.

Professor Leon Chaffee of Harvard a few years ago dissected a frog's eye. He chose a frog because the eye of a cold-blooded animal might be expected better to retain its peculiar properties under experimental conditions. He removed the front of the eye leaving a cup-shaped affair, and found that when light fell upon the eye, a difference of electrical potential was set up between the center of the cup and its rim. By using a radio amplifier and loud-speaker, he was able to produce sound whenever light was flashed upon the dissected eye. He was able to produce a squawk with light he could not see himself.

The frog's eye is an apparatus for converting visible light into electrical energy. May it not be that the eyes of the owl and the bat, while doing this, are also capable of producing electrical energy from infrared?

Grains of Glass

DEVELOPMENTS in the art of the glassmaker have followed one another swiftly in recent years. Out of the union of silica and alkali and lime or lead has come, through research, glass of crystal quality, of better color, and in forms adapted for a multitude of special purposes. Of the ultraviolet transmitting glasses much has been said. More recent are the laminated safety glasses now widely used in automobiles. The production of glass in the form of bricks and tiles offers new opportunities for building.

A recent announcement of unusual interest concerns the development in England of a new process which not only toughens ordinary plate glass, but renders it

Wells-Nesmith

American freighter discharging into lighters at Jaffa, Palestine. Although one of the country's principal ports, Jaffa has no tug because there is no place to keep one! Palestine's engineering development (electricity from the Jordan) was noted in The Review for November

splinter-proof. In breakage, the toughened glass collapses in the form of small granular pieces which are free of dangerous cutting edges.

No less important than elimination of splinters is the increase in mechanical strength imparted to plate glass subjected to this new process, which likewise increases resistance to impacts and sudden changes in temperature. After being processed by this method, the nature of which has not been made public, glass cannot be worked, drilled, or cut. Tests for impact, static twisting, bending, static pressure, and hydraulic shock showed the processed glass to be greatly superior to ordinary grades. In tests, specimens a quarter of an inch thick withstood the impact of a steel ball weighing more than a pound falling a distance of more than 10 feet. Ordinary glass was shattered by the ball in a drop of less than 13 inches.

German glassmakers are also reported to have developed a non-splintering glass which fractures in the form of granules, but information is lacking on whether it is produced by a new method of manufacture or by treatment of ordinary glass.

The rapid increase in the use of safety glass in the United States is indicated by consumption of the various makes of laminated glass during 1931. Of a total of 15,329,000 square feet used that year, 68% was bought by the automobile industry, which was quick to realize the sales and safety values of this added factor.

Passenger automobiles in 1931 carried 8,700,000 square feet of safety glass in their windshields and windows, the average area being 22 square feet per car. The necessity for every precaution for safety in public transportation has been emphasized by the increasing use of local and long distance busses, which, with trucks, used 6,500,000 square feet of safety glass in 1931. The activity of criminals increased the sales by 50,000 square feet which was used in armored trucks; nearly 60,000 square feet were installed in motor boats; aircraft and various other products used another 20,000 square feet.

Rays of Hope in the Arctic

AN INCREASE in the world's supply of radium, urgently needed for further advances in the conquest of malignant diseases, may come, not from the jungle of the Belgian Congo, but from the shores of Great Bear Lake in the sub-arctic barrens of northwestern Canada.

When Robert Service's old prospector in "The Ballad of the Northern Lights" "staked" the aurora borealis for a radium mine, he was lifting his eyes too high. For, while Service rhymed in his tent in the Yukon, he was within a few hundred miles of the tar-like outcroppings of pitchblende which now hold promise of being the world's richest source of radium.

Discovered in 1930 by Gilbert Lebine, veteran prospector, the ore bodies have been thoroughly examined and the Canadian government, impressed by the rich deposits, has developed a new and possibly cheaper method of extracting radium salts from the ore. Although discoveries at Great Bear Lake, across the northern arm of which the Arctic Circle passes in its course through the district of Mackenzie, are spectacular, the Canadian government and the mining interests of Canada have shown praiseworthy caution in appraising the deposits and preparing for their development.

On the basis of experiments with 4,000 grams of radium-bearing concentrates in the government mining laboratory at Ottawa, there are indications that this rich ore will produce one grain of radium from 10 tons

Lobdell

San Mateo bridge, reputed to be longest highway bridge in the world (over seven miles). It crosses the southerly arm of San Francisco Bay

of ore. The new process is expected to speed up the production of radium and to assure a greater percentage of recovery. The fulfillment of prospects for development of this new field may result in breaking the Belgian monopoly.

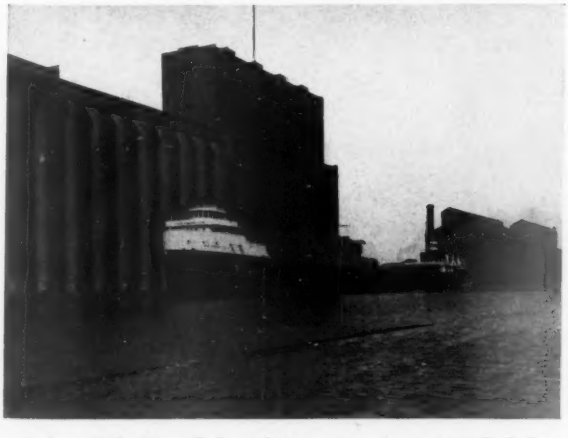
It seems likely that because of the great distance from civilization and the excessive costs of transportation, means will be found to carry on part of the ore treatment at the mines. The concentrates may then be transported elsewhere for final processing. A radium refining plant is already in progress of construction at Port Hope in Ontario, where one of the large mining companies holding territory at Great Bear Lake expects to refine its ore.

Some indication of the need for more radium is well indicated by a survey of the American Medical Association which shows that, although radium has been in use for more than 30 years, only 288.4 grams had been produced in this country or imported up to the end of 1930. How much radium is available for the treatment of disease in the United States is not accurately known, but all authorities agree that it is far below very urgent necessity. The death rate from cancer in this country is now approximately 100,000 annually, while 80,000 patients are given radium treatments.

Engineering in Italy

IMPERIAL Rome at the dawn of the Christian Era found herself the acknowledged leader of the world in engineering. Hydraulic engineers like Frontinus and architect-engineers like Vitruvius were enormously productive the while Roman technologists were accumulating that extensive body of fact which Pliny so meticulously recorded along with so much folklore. Even today, may be found tangible remains of the Roman roads, water supply and sewage systems, circuses, baths, and public buildings which were strewn from Britain to the Sahara and across the Mediterranean lands from Spain to Syria.

After the fall of Rome, the engineering art lay virtually fallow until the seminal developments of the Renaissance — appearing first in Italy — started a technological drive that is today unabated. The resplendent figure of Leonardo, "the founder of modern engineering," Michelangelo (many of the great Renaissance artists practiced engineering), and Galileo were leaders in the awakening that again made Italy a land distinguished for its engineers and scientists. This premiership it was unable to continue through the political turmoil that racked the Italian peninsula until the end of the Nineteenth Century.

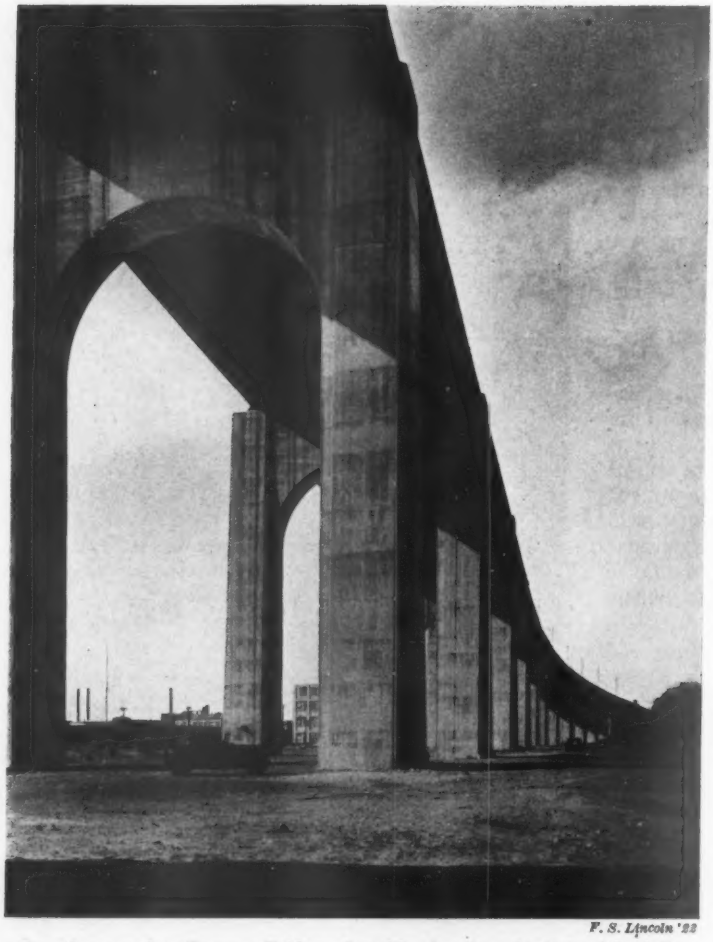


A giant of the Great Lakes taking on a grain cargo at Duluth, Minn., more famous for its iron than its grain

Whittington

Looking up face of Horse Mesa Dam, one of five similar structures across Salt River (near Phoenix, Ariz.), of which Roosevelt Dam is the first

But with such a heritage of engineering achievement it was almost inevitable that Italy for the third time should assume an important place in the engineering firmament. Today she is again in the van of technological progress as a brief review of names and accomplishments readily shows. The name of Marconi, which stands for so much in the field of communications, and Italy's development of hydroelectric power and railroad electrification, her reclamation work on land and sea, and her achievements in the air and afloat are well known. In the current news her giant vessels, *Rex* and *Conte di Savoia*, figure prominently because of the speed and luxury they both afford the traveling public, and the latter as the first gyrostabilized liner. They are worthy successors to Italy's *Augustus*, still the world's largest and fastest motorship. Similarly, we have further evidence of Italian interest in aviation, signalized by the flight of the seaplane squadron across the South Atlantic two years ago, by the development of airships, by the building of racing seaplanes, and by the announced



F. S. Lincoln '22

Curved approach to Bayonne Bridge, selected by American Institute of Steel Construction as the most beautiful bridge, costing in excess of one million dollars and opened to traffic in 1931. Consulting architect on approaches: Cass Gilbert, '80

plans to send a seaplane squadron across the North Atlantic to Chicago this coming summer or autumn.

On the calendar of the world's reclamation projects, Italy's draining of the Pontine marshes is almost comparable with Holland's pushing back of the Zuider Zee. Vast areas of fertile land only 30 miles from densely populated Rome will be thrown open to colonization as soon as roads and rural centers can be built in the newly drained sections. Thus will be converted to useful purposes an area of some 150,000 acres, previously renowned throughout history as a breeder of malaria.

Other striking Italian accomplishments recently in the public eye include: a new system of motor highways; the reorganization of the city plan of Rome and the archæological excavations on Capitoline Hill; the Count Conte development of power from steam wells; the draining of Lake Nemi to uncover Caligula's galley; the work of the salvage ship *Artiglio* in recovering gold from sunken ships; and the building of naval vessels comparable with the new French and German men-of-war.

Some of this activity may be attributed to the reorganized National Research Council, which has been busy in the past four years trying to coördinate Italy's attempts to apply the results of scientific research to the welfare of the nation. This body has already tackled studies of the structural characteristics of large dams, metal bridges, new types of marine engines, bituminous emulsions and cement pavings, wave stresses on harbor works, public health problems (such as fevers, hook worm, rheumatism, and occupational diseases as in the sulphur mines), and agricultural affairs (fertilizers, canning, possibilities of Italian mineral waters, and of African cereals).

Facing the problem of an ever-growing population (to the urgency of which situation the United States immigration laws have measurably contributed), Italy has been forced to turn more and more to industrialization. This has intensified her deficiencies in fuel and raw materials, both of which, broadly speaking, she is obliged to import to make work for her enormous reserve of cheap labor. The Council has, therefore, as a major effort undertaken to make a thoroughgoing inventory of the national fuel resources, has suggested regulations for the utilization of alcohol as fuel, and, in the matter of carbon fuels, has made proposals aiming to popularize the use of solid fuels for automotive vehicles, for both industrial and agricultural uses.

Before the War Italy was using some 12,000,000 tons of English and German coal a year and after the War the English kept the price up while German reparation payments in the form of coal had to come by rail nearly 1,000 miles through the Alps. Hence, Italy turned in earnest to "white coal" with which she had been experimenting ever since 1882, when a young Milanese named Corniana came to visit Thomas Edison and went back to Italy to set up the first hydroelectric machinery in Europe. Whereas before the War, turbines had

Galloway

U. S. battlefleet with searchlights flashing. The Navy has revealed plans for a flying-deck cruiser, and a 20,000-ton aircraft carrier

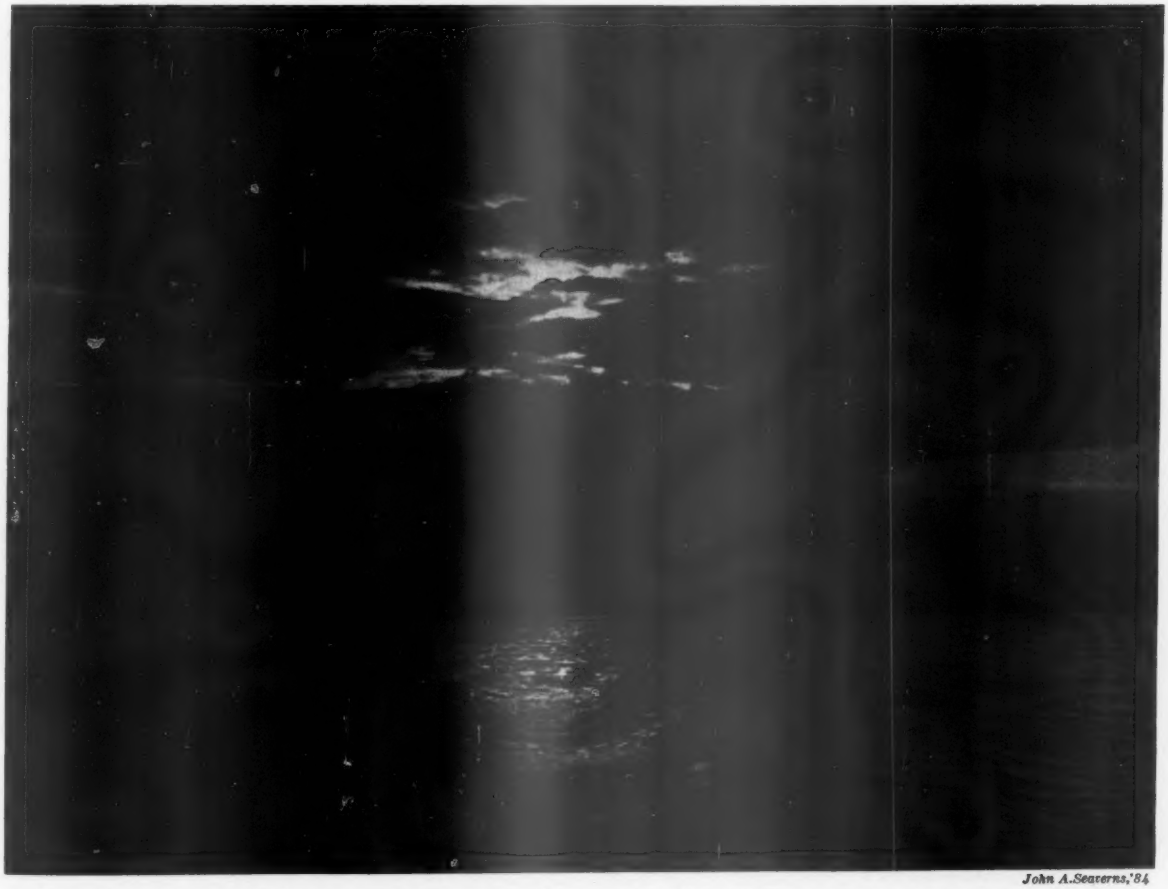
produced two billion kilowatt hours per year, Italy's annual consumption approximately quadrupled during the decade following the Armistice.

Unfortunately, the hydroelectric blessing was not evenly distributed and the more favored agricultural regions of the North, already the area of greatest Italian prosperity, were nearest to the best water power. There was also an unevenness, in that water from the Alps is plentiful in summer, while in winter the streams are ice bound, and in the Apennines the maximum flow takes place in the winter. To cope with these conditions there came about a widespread hook-up of the hydroelectric interests. But rainfall and snowfall are subject to an enormous variation from year to year, and thus older steam plants were kept in operation and new ones built to an extent that by 1924 Italy's coal consumption reached the highest figure of any post-War year. Moreover, as the choicer waterfall sites were developed, continued building of hydroelectric plants made for a diminishing return on the investment in that unit cost of power mounted.

Thus, in paying merited tribute to Italy's remarkable achievements in hydroelectric engineering, which brought relief to Italian industry at a time when need for relief was most pressing, one is impelled to agree with a writer in *World's Work* some years ago who said: "Forty million Italians, increasing at the rate of 400,000 every year, present a problem which electrification alone cannot solve."

Perhaps, however, through the manifold directional activities of the National Research Council, plus the sort of engineering skill and daring exhibited by Italian engineers in erecting some of the world's most magnificent power plants (one operates under the unprecedented head of 3,200 feet), and in other ways which have been briefly catalogued in this monograph, modern Italians may continue to prove worthy of their heritage from early Roman days and the Renaissance.

Perhaps, too, the rest of the world may learn from Italy. As the New York *Times* has noted editorially: "Il Duce says a word to his Research Council and receives a few pages that summarize what Italy's Government scientists have reported. Even in the midst of war we had no such well-coördinated scientific effort as that which Il Duce has put forth in the midst of peace. The reason for Italy's remarkable technical evolution of the last ten years becomes evident. It is not just Fascism, but good management and common sense. Strange that in these trying days of budget-balancing we have not followed the Italian example by centralizing the scientific work of the Government and thus eliminating unnecessary laboratories. . . .



John A. Seaverns,'84

"Before the storm," a remarkable photograph of a sunset over Boston Harbor, with the Custom House tower in the distance. The East Boston Highway Traffic Tunnel, a great engineering achievement, will shortly be conveying motor traffic under Boston Harbor

THE INSTITUTE GAZETTE

Athletics at M. I. T.

AT THE request of the Corporation Visiting Committee on the Department of Hygiene, Dr. Allan W. Rowe, '01, recently presented the following report on Technology athletics to the Institute's Corporation. Dr. Rowe is, it is needless to say, President of the Alumni Association and Secretary of the Advisory Council on Athletics; and the members of the Visiting Committee are William S. Forbes, '93, Henry E. Worcester, '97, and Harry J. Carlson, '92, Chairman.

"I have come here today to present to you a brief statement relative to certain aspects of that major undergraduate enterprise concerned with the conduct and prosecution of athletics. I feel that it would be more apposite for me to stress the important points of the present, and those recommendations and suggestions dealing with the future, rather than to review at length the history of the past. At the same time for purposes of orientation, for those of you who may not be wholly familiar with the record of the past 35 years, I may touch on one or two significant matters. In 1898 at a meeting in which your body, the Faculty, and the Alumni were all represented, it was offered as the unanimous opinion of the group that the supervision of undergraduate athletics should be vested solely in the Alumni.

Scientific study of a light bulb collapsing under a hammer blow. The picture was made by the Edgerton method of high speed photography in the Institute's Department of Electrical Engineering

"The Advisory Council on Athletics, which was the direct result of this decision and which was brought into being by the then existing alumni body, has functioned from that time to the present. Under the wise guidance of Frank H. Briggs, '81, the general principle of student control was clearly enunciated and by judicious legislation confirmed in fact. Up to approximately 1917 the Corporation contact was limited to certain provisions both for physical training and for some forms of competitive exercise. The contact was a limited one but can be felt to have expressed a willingness on the part of your body to meet every expressed need of the undergraduates along these lines.

"With the acceptance by your group of the principle of the Student Tax, subsequently to enjoy the more euphoneous designation of Student Dues, and most recently to have been merged in the general advance of tuition, a larger sum of money became immediately available to the undergraduates for the continuance of existing enterprises on a more liberal scale, and the initiation of new activities as call for them developed in individual student groups. This greater scope to the athletic program carried with it increased need for more extended physical equipment, and as time went on the allocation of progressively larger sums to the direct use of athletics. May I say to you, as one whose connection with Technology athletics antedates the period of functioning of the Advisory Council, that, without exception, every one of these students' needs as they have arisen have been most generously and graciously met by your body with the provision of wholly adequate assistance.

"Turning now, if I may, to certain of the more distinct features of our present system of operation, I would point first to that unique feature which, so far as I know, is peculiar to Technology alone among all of the colleges in this country. I refer, naturally, to the student control whereby final jurisdiction over the conduct and administration of all athletic enterprises is vested in individual undergraduates who are elected by their fellows. Conferring with them is the Alumni Advisory Council in whose power lies the possibility of assuming final mandatory control should necessity arise. This is, naturally, a safeguard against the over-enthusiasm of youth not to be invoked lightly but none the less serving as an insurance of the Institute against any untoward happening. It is with a real pride and pleasure that I may report to you that at no time during the many years of functioning has it been necessary for the Advisory Council to exercise this power. This is, I think, the more noteworthy when one considers that on a gross expenditure of some sixty-five thousand dollars ($65,000), approximately one-half of which derives from your body through various channels and provisions,

while the other half represents the student contribution from its various sources of income, the student body is offering to itself helpful athletic activities which at some time or other during the year engage fully one-half of its membership. To put the matter more concretely, the undergraduate group is operating yearly some 34 varsity and class teams for the gross outlay named above, and at no time have they shown an operating deficit at the end of the year. As a matter of fact, during the last ten years a modest but appreciable sinking fund of several thousand dollars has been accumulated against future contingencies. That this bespeaks a prudence, a wisdom, and a sound judgment, must be so apparent as to require no further emphasis on my part.

"A second point that I should like to touch upon briefly is the fact familiar probably to the majority of those present, that we enjoy an enviable reputation for the fine qualities of sportsmanship exemplified by our individual competitors and by our teams. On the one hand, I need only point to the flattering report of the Carnegie Foundation in its survey of American athletics compiled in Bulletin 23, in which Technology was named among the very small group of American colleges the amateur status of whose players was completely above suspicion. On the other hand, I may quote the words of a well-known critic and writer on sport who a year or two ago commented to the effect that the 'Technology Crew was willing to row anyone, anywhere, at any time.'

"There is another side to the medal, however, and while we have right to be very proud of what we are doing, both in developing character and providing the means for the building up of clean, healthy bodies trained in the arts of contest and obeying the fine and simple code of true sportsmanship, there are other factors in which we are not so fortunately placed, other needs which if at some future time can be met will increase greatly the benefits which are now being conferred. It seems fair to say in this connection that the consensus of informed opinion in this country today is that the athletic program constitutes a necessary and highly valuable portion of the general educational plan.

"When we moved across the river and into the new quarters which we now enjoy, provision was made for the incorporation of gymnasium facilities into the building primarily designed as a student clubhouse. From the beginning this modest provision failed, in part at least, to meet the needs of the student body of that time, and with a just and generous recognition of its limitations, your body subsequently reclaimed rather more than half of the storage space in the temporary building erected as a hangar, and created a second gymnasium to permit of needed expansion. Today with a student body of roughly three thousand, the existing facilities compare frankly unfavorably with those provided by much smaller institutions for their respective student bodies. This would be a matter of indifference were our facilities adequate to meet our needs but this, I assure you, is not the case and at some time in the future when and as the financial situation becomes such as to warrant the outlay, a new and adequate structure should be erected to provide more adequate opportunities for future generations of

M.I.T. Photo

New plane purchased by the Institute for aerological research. A substantial grant from the Rockefeller Foundation has permitted an expansion of the high altitude research described in The Review last May

Technology students. In the contemplation of such a building program, due allowance should also be made for the erection of a new Boat House. The present structure, presented to the student body through the generous gift of the Corporation, has served and is serving adequately a large number of the undergraduate body. The Metropolitan Commission, however, in whom is vested the control of the riparian facilities on the Charles has drawn plans which will necessitate the transfer of the Boat House to another site when our present lease from them terminates. This is a matter of some ten years hence.

"As the athletic facilities determine one major factor in the development and maintenance of a high level of health in your student body, so the present Department of Hygiene created many years ago on a very modest basis and growing within the last few years to highly significant proportions, makes a second major contribution toward this desired end. Our Technology students are peculiarly situated in that the academic curriculum makes a far heavier demand on their time and energy than does the more liberal and elastic schedule of the so-called liberal arts college. This bespeaks a greater need for a compensatory program of exercise and health building and yet by the very nature of the cause, namely, the circumscription of time, the remedy is in some measure denied. This does not mean that our student body should be denied such benefit as they may find under the necessarily limited conditions of practice. Rather it means that every encouragement should be given them to realize its benefits to the full and to provide an even more comprehensive program for the safeguarding of health and for its restoration through medical service than even the present most liberal and extremely efficient provision offers. In all frankness, I look forward to the day when the splendid service which you are rendering at the present and the benefits of which I am acutely mindful may be supplemented by the addition of other workers, specialists in fields peculiarly concerned with these problems. Further, and as a complement to the foregoing, I would like to see

Technology add to its many pioneering services in the community, the organization of investigative work in these departments whereby we may bring a yet larger measure of correction and of maintenance to the needs of the undergraduate group.

"In conclusion, may I express both my profound appreciation for the courtesy extended to me by you in permitting me to place these matters before you and equally to add that I have found courage so to do because of the unfailing sympathy, consideration, and generosity with which your body has met each previous problem in this field as it has been presented to you."

Annual Alumni Dinner

PLANS are virtually complete for the annual dinner of the Alumni Association which is to be held at the Hotel Statler at 6:30 on the evening of February 4. President Rowe will preside, and speakers will include Sir Wilmot Lewis, the famous English journalist, Dr. Walter B. Cannon of the Harvard Medical School, and President Karl T. Compton.

There will be a scientific exhibition — notably of the method of high speed photography developed in the Institute's Department of Electrical Engineering. In contrast to recent years, the dinner will be a stag party. The Committee on Assemblies announces that the price will be much lower than it has been for any recent dinner.

162nd Alumni Council Meeting

ON NOVEMBER 28 the Alumni Council dined and convened in Walker Memorial for its monthly meeting. Attendance at this meeting exceeded that of October — 88 being present. In the main, it was a session devoted to relaxation and enjoyment, a natural reaction to the long discussion on the new plan of Alumni reorganization which took place at the October meeting.

Dr. Vannevar Bush, '16, Vice-President of the Institute, was the salad orator of the evening, and he told of his recent meeting with the Detroit Technology Club. After dinner, President Rowe called upon the following men to rise and present themselves to the meeting, this being their first experience as members of the Council: George T. Cottle, '98, new Representative-at-Large; Robert E. Hendrie, new Representative of the Class of 1923; Richard L. Fossett, Jr., President of the Class of 1933; Edward J. Collins, President of the Class of 1935.

The Secretary, Professor Charles E. Locke, '96, reported that dues collections up until the day of the meeting totaled 5,023 which is 1,467 or 22.6% less than on November 28, 1931. He further reported that at the Executive Committee meeting eight new members had been elected to the Alumni Association; that Charles W. Sherman, '90, had been elected representative of his Class in place of John O. DeWolf, '90, recently deceased; that Dr. Vannevar Bush, '16, had visited the Detroit Club on Wednesday, November 16; that arrangements were proceeding for the annual alumni dinner, and that Saturday evening, February 4, 1933, had been definitely decided upon as the date; that it was also settled that the dinner this year would return to the former custom of having only those ladies present who were former students, or who were special guests for the occasion.

Three sets of resolutions were next presented: For John R. Freeman, '76, read by the Secretary; for Frederick H. Newell, '85, read by Professor A. H. Gill, '84; for George K. Burgess, '96, read by Merton L. Emerson, '04.

The President referred fittingly to the death of John O. DeWolf, '90, which occurred November 17, 1932, and also called attention to the death of Morris Knowles, '91, which occurred November 8, 1932.

Having disposed of the foregoing business with a dispatch which put it through in almost less time than it takes to tell it, President Rowe introduced Dr. George B. Magrath, the distinguished Medical Examiner of Suffolk County who, for an hour and a half, had his audience following him closely as he carefully reconstructed the evidence which he had found in several famous cases, to arrive at final clear-cut conclusions, which were often contrary to the first impressions received by investigators making earliest appearance on the scenes. These included bullet evidence in the Sacco-Vanzetti case; the evidence of thermit in the Small murder case at Ossipee, N. H.; the definite solution of the murder of the captain of the barge *Glendower*, and a number of others. Everyone departed with a feeling that it had been, not only an interesting evening, but also a profitable one for all.

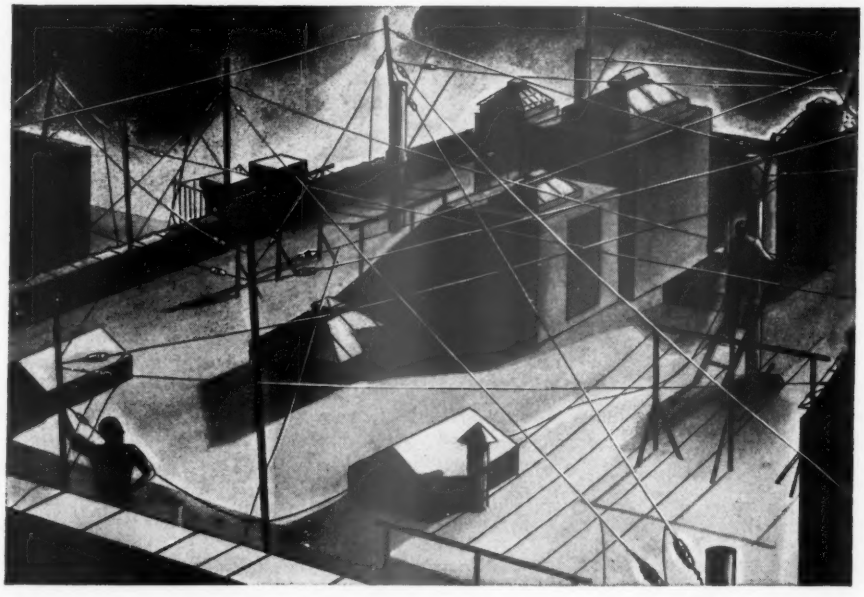
THE ORIGIN OF THE LATHE

(*Concluded from page 135*)

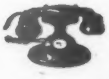
with a foot treadle and balance wheel, a screw cutting lathe, and a lathe with a chuck of surprisingly modern design.

Figure 1 is the oldest known representation of a lathe and it may be interesting to compare this with a photograph of the oldest lathe in existence, shown in Figure 3. This lathe was presented to the Roman Emperor Maximilian I about 1500 and has been preserved on account of its remarkable carving. The head and foot stocks only are shown, each with its center. The device between them is a steady rest. The drive — not shown — was from a foot treadle to a cord wrapped around the work and to a horizontal spring pole attached to the ceiling beams. Each time the royal turner pressed the treadle down the work revolved towards him and he thrust the cutting tool against it. The spring pole then lifted the treadle, during which time the tool was removed from the work which was then rotating in the opposite direction. The operation is clearly shown in the 17th Century cut (Fig. 4) from van Vliet. We here note that during the 2000 years from 300 B.C. to 1700 A.D., lathe design had improved by the addition of a sturdy horizontal member and the development of a one man drive, but the intermittent action of the turning tool remained unchanged. It was 300 years before da Vinci's suggestion for a lathe with a fly wheel and foot treadle providing continuous rotation in one direction was commonly adopted. From this point the development of modern lathes began.

America comes out of the ROOF-TOP JUNGLE!



Up-to-date apartment house owners are showing the way out. They are using a new Western Electric product—the Radio Frequency Distribution System. As a result tenants are getting improved reception and a new kind of service. ¶ With this apparatus, every set owner has his own lead-in to one central antenna. He gets any station any time without cross-talk or other interference. No longer need he put up his own outside aerial or be satisfied with inferior results from an indoor antenna. ¶ The equipment serves hotels and other types of multi-family building, as well as apartments. And Western Electric's experience of 50 years in manufacturing telephones for the Bell System counts heavily in the making of such related equipment as the Radio Frequency Distribution System. Get further details of this new development from its distributors, Graybar Electric Company, Graybar Building, New York, N. Y.



Western Electric

LEADERS IN SOUND TRANSMISSION APPARATUS

THE INSCRUTABLE 'THIRTIES

(*Continued from page 126*)

was quite muddled in his thinking process as seen from our present vantage point. He would, as I have said, readily accept the solution of such a complex thing as television to be imminent — as something he might find poking its way into his bedroom unawares on a bright Sunday morning. But he would consider a reasonable improvement in such an elementary thing as the arrangement of sleeping car space (it was really being tried by the railroads at the time) as incapable of realization for a couple of generations at least.

All about him he could see bridges, viaducts, steamships, engines, and so on, being built at hitherto unprecedented sizes. And, if some publicity agent issued an optimistic statement to the press that in the coming year they would be built twice as large again, he'd accept such a radical prediction with little emotion. Yet, when it was proposed to make it practicable for those who were neither too fat nor abnormally tall to undress in an upper berth, his reaction was likely to be expressed in the quaint vernacular of the day by some such expletive as "boloney" which, it seems, signified intense incredulity and an impatient skepticism.

As afternoon wore on the lights in the college buildings would be started. These were undoubtedly of the incandescent type in which a wire of tungsten in a gas-filled globe was heated by direct passage of current. About 95% of the energy furnished the lamp went into heating the room. The color was yellowish, and, as the sources were usually concentrated and small, there was formed a complex system of shadows. Lights would be forced on his attention again as he drove home, for there were no polarizers and the full beams of an approaching car would often strike in his eyes and temporarily blind him.

The professor's home had been built in position by the hand work of men of a dozen trades, who obtained materials by small-sized purchases from as many dealers, and cut and fit these materials on the site. It had meant an expensive capital outlay, and as much as a fifth of his income went into fixed charges on it. It had a cellar. This cellar, by way of explanation, was a large hole dug in the ground under the residence, and was a relic from the days when heating appliances required a cellar for their distribution pipes, which were so dirty that it was well to put them underground, and when thermal insulation was so imperfect that a ground floor of a house without a cellar was expected to be cold. Although these factors had ceased to be determining, the cellar with its expensive excavation has been continued as a sort of tradition.

Of course the house was immobile, and the idea of disassembling and transporting a house to a new site would have been considered quite radical. The heating plant was as crude as the one at the office, and even less efficient on account of its small size. Rooms were not soundproofed, hence many noises could be heard all over the house. This was particularly true of the plumbing fixtures, which made quite a racket. The floors were covered with fabric rugs, with (*Concluded on page 148*)

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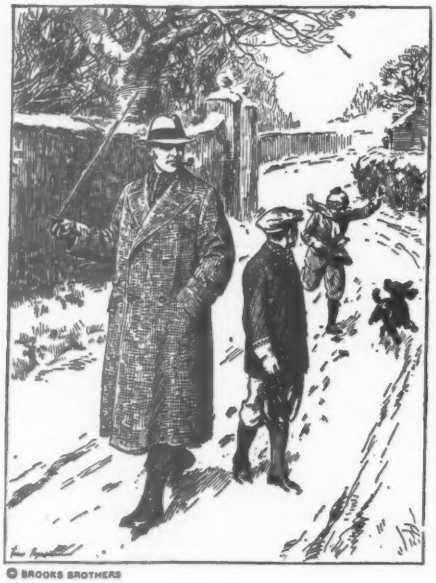

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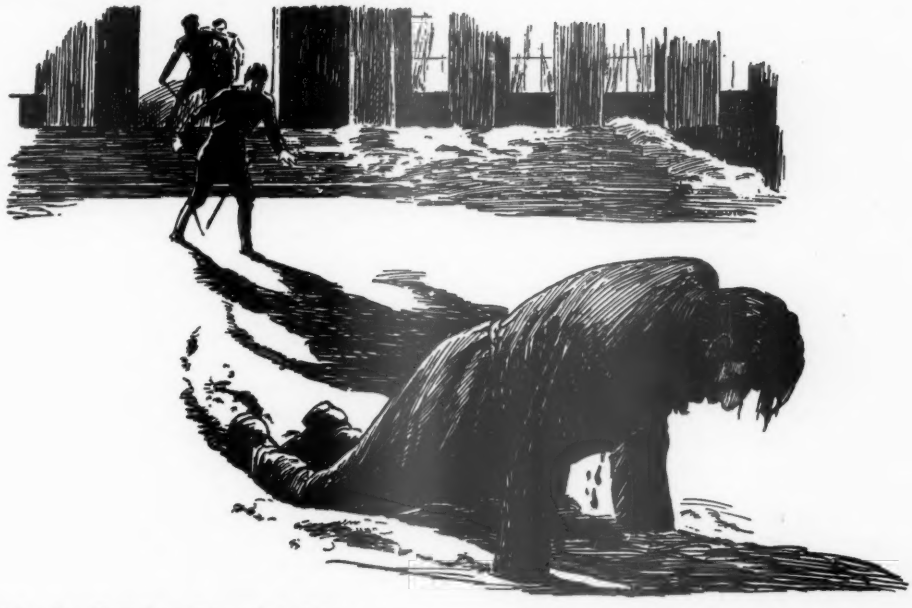
End of Rasputin



In 1916, the Russian Imperial Court, confronted with reverses at the Front, restless conditions throughout the country, needed a great leader, drew instead a charlatan, Grigori Efimovitch Rasputin.

Combination medicine man, "mughik," priest, petty politician and lecher, Rasputin had literally lifted himself by his own boot straps from a lowly palet in a sod cottage in Pokrovskoe, Siberia, to the most ornate and elaborate beds in Imperial Russia. Endowed with an amazing personal magnetism, and an almost supernatural power over women, both bodies and souls, he is reputed to have repeatedly cured the puny hæmophilic Tsarevitch, thereby gaining complete control over the Czarina. Russia, guided from behind the scenes by the miracle worker from Pokrovskoe, steadily sledded down hill, while opposition to Rasputin crystallized in a powerful group of the nobility.

As TIME, had it been printed in December 1916, would have reported subsequent events:

As most Russians were on their way to bed one night last week, a closed car came to a stop at the side entrance of Prince Felix Yusupov's palace. Two heavily wrapped men hurried inside. One, tall, with unkempt beard and hair, dirty stained cloak, was Rasputin, Russia's mysterious power behind the throne. The other, slight, dapper, well dressed, was Prince Yusupov, husband of Grand Duchess Irina, most beautiful woman in Moscow.

For many months, lecherous Rasputin had heard of the beautiful Grand Duchess Irina, was especially delighted at the possibility of a private meeting with her. As the two entered a small downstairs dining room the Prince explained to Rasputin that his wife was entertaining friends, would join them soon.

While Yusupov listlessly strummed a guitar Rasputin consumed a plate full of small cakes, and in them enough cyanide of potassium to fell a squad of cossacks. Every minute expecting to see the Siberian priest pitch headlong onto the floor, Yusupov became unnerved, excused himself saying he would bring his wife.

Quickly getting a revolver from a friend upstairs, the Prince returned, shot Rasputin through the chest, immediately rushed back to his friends to revive his ebbing courage with a strong drink. Returning later with his friends, he found the room empty. In the middle of the snow covered court yard they found Rasputin, crawling, a trail of blood behind him. Frenzied, they shot and pummelled him into unconsciousness, tied his hands and legs. Throwing him into a car they drove to the Neva River, unceremoniously dumped the body in.

Three days police searched for the body while Yusupov at first protested innocence. Finally the body was recovered, the lungs filled with water, showing that Rasputin was alive when thrown into the water.

Yusupov finally admitted, then proudly boasted, of carrying out the assassination, and many rejoiced, but on the lips of Rasputin's followers is his oft repeated statement: "So long as I live, the Imperial Family will live, when I die, they will perish."

So, too, would TIME have reported how Yusupov was dismissed without punishment by the vaccilating Czar; how, 5 months after Rasputin's death, Imperial Russia ceased to exist; how chaos followed turmoil, the Bolshevik coup d'etat followed chaos.

TIME

The Weekly Newsmagazine

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THE INSCRUTABLE 'THIRTIES

(*Concluded from page 146*)

their stores of lint and dirt which was sometimes removed with a suction cleaner — incidentally the noisiest implement in the place. Some of the furniture was also fabric covered and stuffed with natural horsehair as a sort of pseudo-elastic filling. It is not pleasant to contemplate in retrospect.

The excess of noise has been mentioned often in this review. One would think there would have been general protest, but the subject was only mildly mentioned in the contemporary newspapers. There was, in fact, some indication that the people generally liked to have a lot of noise about; at least they may have considered that its presence was conducive to intense activity in some manner. In no other way can we explain, for example, a turnstile which had been installed in large numbers in subways, and which was purposely arranged to give a loud clack whenever it was operated. This same peculiar love of noise was also exemplified in the contemporary music, which throws so much light on the strained mass psychology of the period.

The typical newspaper of the Nineteen-Thirties was a large affair, which reached truly ponderous proportions on Sunday. A single edition would then contain as much as 500 square feet of fine print. Of course no single individual could read all of this, and most people read much less than one per cent. Yet the forests were denuded — for paper was still made from pulp obtained from fair-sized trees — in order to print this mass of waste material. Bulky newspapers were one extravagance chargeable against the mania for advertising which had reached grotesque proportions. Nowhere were its extent and its methods more ludicrous than in the advertising of such things as cigarettes. A single phrase, usually quite absurd, would be repeated thousands of times in newspapers as well as on large placards placed by the roadsides (of course entirely out of harmony with the scenery), in trolley cars, and everywhere where space could be found. All this was done at enormous expense and without relief from the monotony of the repetition. One would expect there might have been a protest in the form of a boycott of any article thus intrusively offered, but, on the contrary, such methods apparently succeeded in their purpose. The cost of distribution to a public with so little true discrimination was, as we might expect, a heavy economic burden.

Our professor, after his dinner, had many possible diversions. It is very likely that he participated in one of the peculiar popular pastimes which swept the country in sudden waves at about this period in history, exemplifying again the inexplicable mass psychology in force. One of these was a game called contract bridge, which persisted for several years and which was regarded with great seriousness by its devotees. It was participated in by both sexes, although it is hard to understand how their joint adherence to what was essentially a cult for mental exercise came about. Very complicated and artificial rules controlled the action, and the whole procedure must have been wearying, although it was indulged in by large sections of the population, sometimes to the substantial exclusion of all other mental activity. The force of mass opinion was so strong and individualism so repressed, that not to follow the public whim of the moment was to lose social caste. One of the strangest of these pastime manias occurred when over $100,000,000 was spent in the building of small gardens in which the participants knocked little white balls about among various obstacles. This lasted, as would be expected, for only a few months.

An epidemic of jig-saw puzzles also swept the land. Though harmless in themselves, the distress of elderly people and children alike when some piece or pieces dropped to the floor and became hidden in some out-of-the-way place, was apt to be expressed in fitful bursts of temper.

It is little wonder that under such hectic conditions many professors developed otherwise unaccountable tendencies, and that the science of the times was disjointed, heterogeneous and very much an opportunist affair. There should be the greatest of admiration for one who could do any constructive thinking at all when thus badgered about during the Nineteen-Thirties.

Today, quite correctly, we realize that all of the desirable modifications of our natural environment, which are possible through simple mechanical means, have been accomplished. Even 20 years ago there were significant indications that the door to progress along such lines was fast closing. About that time the standing Congressional Committee, appointed to consider the scope of the world's scientific and technical progress with special reference to its bearing upon matters to be discussed at a proposed conference to be convened for the further discussion of inter-governmental debts, was able to include in its preliminary report the convincing statement that everything worth while had been done.

What a contrast to the Nineteen-Thirties! Then it should have been possible, even by the most rudimentary of analyses, to have disclosed attractive avenues for constructive effort.

It may be asked why, with all this opportunity, we had to wait so long for the obvious. It could not have been because of a lack of leisure; for there were emphatic contemporary complaints that leisure engendered by the quickening of production had become both burdensome and notoriously unwelcome. Perhaps it was ascribable in a measure to the prevailing social code which then forced all men to dress alike and, to some extent, to think alike. Or, it may have been that the pressure of advertising propaganda had induced a mass psychology which led people to believe they had arrived at some sort of mechanical Utopia with which they were in duty bound to be content.

These few suggestions are typical of the myriad of hypotheses contained in the extensive literature dealing with this quite amazing decade in the history of the Republic. From all the thought given to the subject but one solitary fact emerges: the Nineteen-Thirties still remain inscrutable.

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THE DRIVE FOR HIGHER STANDARDS IN THE ENGINEERING PROFESSION

(*Continued from page 133*)

The American Medical Association was established in 1847, its chief object being stated as the "improvement of medical education in the United States." The American Bar Association, formed at Saratoga, N. Y., in 1878, was "to advance the science of jurisprudence, promote the administration of justice and uniformity of legislation and of judicial decision throughout the nation, uphold the honour of the profession of the law and encourage cordial intercourse among the members of the American Bar."

In 1904 the American Medical Association created a permanent committee whose duty was to carry out that expressed as the chief object for which the Association was founded. This led, in 1910, to the publication of a grading of medical schools, dividing them into three classifications — A, B, and C. Without further detailing the ensuing developments, it may be safely stated that the Association's effectiveness in promoting higher standards of medical education have continued up to the present day.

It is not so easy to trace in any simple way the improvement of the standards of the law schools through the efforts of the American Bar Association. There is a record that it gave the matter early consideration for, in 1879, it was in receipt of a report from its committee on "Legal Education" which, it is said, was treated with "scant courtesy" by the Association. As time went on, successive efforts undoubtedly met with more cordial receptions, but the present high standards of legal education in the United States, speaking broadly, may be said to have come about more from movements within the schools themselves and through the interest of the courts than from the Association.

While the Boston Society of Civil Engineers, founded in 1848, seems to have been the earliest American engineering society which has come down to us with a practically uninterrupted record of existence, the first national body was the ASCE, established in 1852. The other three of the group known as the "Founder Societies" were: AIMME established in 1871, ASME in 1880, and AIEE in 1884.

IT WILL be seen, therefore, that the situation in engineering, so far as professional bodies are concerned, differs from medicine and law in that there is no single preëminent national association. Even to name all the various organizations which, in addition to the "Founder Societies," have some justification to claim to represent *nationally* those engaged in one or more "branches" of engineering or its related sciences, would require at least a page of this magazine. Coöperation between many of these groups has existed, from time to time, in varying degrees, but, it is said, ECPD represents the first time that as many as *seven national* engineering societies have embarked officially upon a joint enterprise.

(*Continued on page 150*)

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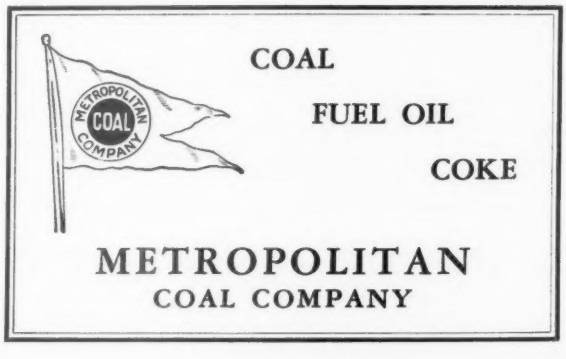

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HIGHER STANDARDS FOR ENGINEERS

(*Continued from page 149*)

Probably the deliberations of every engineering society have included consideration of the problems of technical education. In certain of them, such as the ASCE, it has long been a practice to credit graduation from an engineering school of "recognized" or "acceptable" standing as fulfilling certain specified admission requirements. However, the autonomous nature of the different societies has, as can readily be seen, made for a wide variety of regulations. Each has quite naturally insisted upon determining which schools it will "recognize" or "accept," and also each has had to pass upon the equally delicate question as to how it will "interpret" its regulations in practice. The AIChE is an example of a society which publishes a list of schools it has accredited after careful and considered investigation; but others, who maintain such a list of schools, regard the list as a most confidential asset — or liability.

Further complications are introduced by the differing admission requirements of the societies. Some are "exclusive" with rigid qualifications, and others are "inclusive" to the point of admitting anyone of good moral character who indicates a willingness to be interested to the point of paying membership fees. Then, too, certain of the older societies, as the secretary of one expressed it several years ago, long believed their purpose as "merely to foster and disseminate those technical matters in which their members were primarily interested." He continued, however, to say that there is growing "a very definite consciousness that in so doing they have been failing to render service to their members along lines which contribute to their material well-being, not so much as individuals, as to a group, worthy and in need of more specific recognition of value by the public."

The NCSBEE, upon being formed in 1920, found itself faced with an immediate need for prescribing the education and training required to obtain a certificate of registration of the full status of professional engineer. The so-called "grandfather clauses" in most of the state acts, by which the board of registration was obliged to certify anyone who was actually engaged in practice as a professional engineer at the time the act was passed, settled many problems. But most of the state acts permitted graduation from an "approved" school to be accepted as the equivalent of a certain amount of professional experience. However, since the number of years of professional experience required by the codes of the different states varied from ten to zero, since the duty of determining "what is an engineering school of approved standing" was placed upon the registration board, and, finally, since the NCSBEE hoped to establish some basis for reciprocal registration between the states, one can appreciate that the NCSBEE had a pressing interest in technical education and its standards.

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A movement to dispel some of the chaos due to there being practically as many different kinds of registration codes as there were states licensing engineers, culminated in a conference of representatives of the ASCE, ASME, AIChE, NCSBEE and other bodies on April 15, 1932. From the meeting emerged a draft of a "Model Law" which would serve as a working instrument for states considering the enactment of such legislation and could, in time, be translated into force in states now registering engineers by amendment of existing legislation. Thus, the conference "*Resolved:* To recommend the adoption of this Model Law for the Registration of Professional Engineers and Land Surveyors by all National, State, and local organizations of engineers as a model to be followed in the framing of all new registration laws and the amending of existing laws, with a view to attaining a uniform high standard throughout the United States."

Included in the draft of this "Model Law" was the statement (section 12) that "minimum evidence satisfactory to the Board that the applicant is qualified for registration as a professional engineer" shall be:

"*a.* — Graduation from an approved course in engineering of four years or more in a school or college approved by the Board as of satisfactory standing; and a specific record of an additional four years or more of active practice in engineering work of a character satisfactory to the Board, and indicating that the applicant is competent to be placed in responsible charge of such work; or

"*b.* — Successfully passing a written, or written and oral, examination designed to show knowledge and skill approximating that attained through graduation from an approved four year engineering course; and a specific record of eight years or more of active practice in engineering work of a character satisfactory to the Board and indicating that the applicant is competent to be placed in responsible charge of such work."

While the above action contributed nothing toward a solution of the difficulty of determining "what is an engineering school of approved standing," it did serve to reëmphasize the need for some centralized accrediting agency, which need had been pointed out in the report of a committee on the "Advisability and Practicability of Classifying the Engineering Colleges" to the 39th Annual Meeting of the SPEE held at Purdue University in June, 1931. This SPEE committee consisted of Calvin Rice, '90, Dean R. L. Sackett, Emerson B. Roberts, and President William E. Wickenden of the Case School of Applied Science as chairman.

The committee's work had its genesis in the well-known and highly competent survey of technical education here and abroad conducted by Dr. Wickenden for the SPEE during the immediate post-War years. Many of his observations were reported in two articles in The Technology Review for May, 1924, and April, 1926. Since the report of the later committee may serve as a legitimate point of departure for the ECPD's labors, some of the findings are apposite for citation as a conclusion to this article. They were, briefly:

That existing academic accrediting agencies were devised primarily for the arts colleges and are unsuited to the needs of engineering (*Concluded on page 152*)

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HIGHER STANDARDS FOR ENGINEERS

(Concluded from page 151)

colleges; that, when the SPEE was established in the 'Nineties, technical education was probably more in need of expansion than of protection of its standards, but conditions have since changed significantly; that only rarely are new engineering schools now being established under public support or with adequate endowment but a considerable group of proprietary schools have grown up, with slender resources and uncertain standards.

That an accrediting standard for engineering schools would offer little direct advantage to the strongly established institutions, but might be much desired by the newer ones; that "indirectly it would give the established institutions some control over the growth of the system of which they are a part, provided the standard of recognition is high enough to be a spur to promising new undertakings and to deter those which are ill-advised"; that accrediting may be of value as a guide to the acceptance at par of the credentials of students wishing to enter one of the established colleges by transfer or as candidates for higher degrees.

The committee invited an expression of opinion from 47 leading members of the SPEE and found:

4 thought present academic accrediting agencies met all the requirements of the engineering colleges, while
36 thought they did NOT.
18 felt the most important aim, in case the SPEE should undertake to frame and administer an accrediting standard, should be to check the establishment of schools with inadequate resources and uncertain standards, while
7 felt it should be to upgrade the weaker institutions now existing, and
7 felt it should be to aid in establishing suitable standards of recognition by professional societies.

In case the SPEE should undertake to frame a standard the following number of answers thought "much weight" should be given to the factors indicated:

27 to total requirements for admission, and 16 to specific requirements for admission.
Requirements for graduation: 19 to total weeks of attendance, 20 to total hours of instruction, and 11 to total credits; 25 to credits in sciences, and 18 to credits in major technical field.
22 to number of teaching staff relative to enrollment.
26 to scholastic qualifications of teachers, 27 to their experience qualifications, 15 to their professional affiliations, and 13 to the proportion of teachers of senior ranks.
13 to income relative to enrollment, 7 to the proportion of income not derived from student fees, 18 to the value and character of equipment as related to enrollment, and 14 to the extent of the library.

In summarizing the above answers the report said, "Views on the possible criteria of accrediting are strikingly consistent, with the greatest weight on the qualifications of teachers, admission requirements and the credits required in scientific branches. There is a background of sentiment that a really valid accrediting system should be based on the human product of the colleges rather than on any quantitative rating of their requirements, resources and staffs."

THE QUEST FOR A BETTER HOUSE

(*Continued from page 131*)

develop a whole set of building materials of standardized dimensions which would coöperate with the standardized spacing of the holes. The frame itself was light, easily produced repetitively, and cheaply shipped.

In the last analysis, however, all that was provided was a frame, costing considerably more than the wood frame it displaced. Although slightly better, the frame could not justify its increased cost. Finish and accessories still had to be supplied largely in the traditional manner. No doubt the increased cost is inherent in the idea. Steel used in small sections as a column must be used at a reduced fiber stress, so excess material was demanded by this type of framing. This conclusion is verified by inspection of a picture of one of these frames, a veritable forest of steel. Roof pitches offered a great difficulty. Each span and slope required different connections and the company either had to adopt a standard pitch or lose itself in a plethora of diverse details.

This corporation was a large one, with great resources and experience. It went into the question of steel framing in a big way. Time enough has elapsed to draw the conclusion that the effort has gone the way of most others.

Of course there have been myriad other frames whose sponsors apparently thought they had something better. One or another provided this or that interesting floor or roof detail but, in general, all the approaches were as unpromising as the one described. One company multiplied its difficulties by pre-welding parts of the frames, thus confounding its problems with those of Atterbury. Others tried to combine cork and other insulating blocks into more complete walls and did get beyond a frame but never into a house. Replacing every piece of wood by a piece of steel seems to be definitely hopeless.

b. *Skyscraper construction*

Members of the second school of thought looked upon the skyscraper and found it good, but they did not look far enough to penetrate the real principles of big buildings. These people erected frames of relatively heavy members, such as small H-columns and junior I-beams, used with their full structural value and hence placed at relatively great intervals. Such a scheme was proposed by Robert Tappan, who still believes in steel, but, according to a recent article by him, has come to the sobering conclusion that the public is not yet ready for the steel frame.

The true principles of skyscrapers have only recently been understood by those who build them. Brick and stone have considerable wall strength but are incapable of sustaining the loads of many floors. Thus early skyscrapers had steel frames which carried all the load and used traditional load-bearing materials as fillers. Lately the designers of high buildings have realized how ridiculous this is and are turning to experiment with lightweight metal fillers.

Now the same materials that cannot be load-bearing in a skyscraper will more than carry house loads. None the less we see proponents of the structural steel frame blithely ignoring this principle, (*Continued on page 154*)

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(*Continued from page 153*)

ignoring recent advances in skyscraper design, and building heavy frames of steel only to fill up all the spaces with brick, tile, concrete, or even wood. Just what function the steel frame serves is not apparent. It represents an extra and utterly unnecessary cost.

Even admitting a reason for such a frame, it may be noted that this type of building furnishes only a wall and moreover does not lend itself to mass production, standardization, or flexibility. A given steel beam has rather narrow limits of efficient use. For some spans it is the perfect choice; for lesser spans it is too big; for greater ones it must be used at such reduced stress as to be uneconomical. Consequently this type of frame must either choose one beam and use it, efficiently or not, or else change the sizes for varying spans and situations. Either way economy does not lie.

Be it said to the credit of the European investigators that few have dallied with the idea of the steel frame. The only significant effort in this direction was by Dorman, Long and Co., Ltd., who presented a steel frame with welded wire mesh reinforcement, stucco shot on with a gun, cork insulation and concrete plaster inside. Few houses were built of this type and the effort has now lapsed.

Pre-Made Metal Panels

The really encouraging efforts in solving the problem by the use of metal have almost entirely been made by those who have tried varying forms of metal panels. The oldest metal house of which I know, built over a century ago at No. 1 Lock, Tipton Green, England, is of this type. It has flanged iron plates for walls and iron window frames. But nothing more was done in this direction for a long time. It remained for post-war Britain to give real impetus to this movement.

After the war the housing shortage in England was serious and the steel industry, at a low ebb, employed every resource to move its products. Lord Weir, for example, developed a house in which thin steel sheathing was applied to a light steel frame while thin sheets of asbestos-cement were screwed to the frame for interior finish. Atholl Steel Houses constructed a frame of light angles to which they fastened thick metal plates coated on the inside with granulated cork. The interior was finished with fiberboard. The most promising of these schemes was presented by Braithwaite and was known as the "Telford" system. Here ⅛-inch steel plates were formed with their edges bent at right angles to form a pan. The backs of these pans were closed with asbestos sheets. The flanges were butted and bolted together. A little later, in Germany, the "Blecken" system used coppered steel sheets formed like those of Braithwaite and wood battens to support interior finish sheets of fireproof insulation.

I have described these in some detail because they are the clear progenitors of the General Houses scheme recently proposed by Howard Fisher. This proposal has probably received the widest publicity of any scheme yet offered the American people. Claims have been made for General Houses that it has finally achieved an actual integration of the housing industry. It is not my place here to consider whether the statements made about the organization are or are not extravagant; or whether or not any company could accumulate sufficient working capital to take care of the large accounts receivable implied in the proposed method of financing. The general principles set forth in the prospectus will have to be adopted sooner or later in any integration of the industry and we may here concern ourselves with the proposed method of construction — a method by which no houses have yet been built and which must be criticized on the basis of pen and pencil sketches.

General Houses proposes rather radical changes in living conditions in order to simplify its problem. This is not a pioneering thought, as I shall shortly point out. But the Fisher plan is not so extreme as to invalidate all his later conclusions. He does hold strongly for single-story dwellings and flat roofs and it may be remarked that acceptance of these restrictions would materially have aided previous investigators. Undoubtedly if Fisher can make his houses sufficiently cheaper than conventional types, he will be able to obtain grudging acceptance of them. Modern design is now sufficiently understood so as not to cause horror, and metal finishes are familiar to most people who have ridden in Pullman cars.

The Fisher scheme proposes a metal panel, facing the weather unashamed and unconcealed. He makes it serve the double purpose of structure and finish. Like those of the "Telford" and "Blecken" systems, the new panel has its edges turned back and there is an insulator behind the metal. Again the edges are bolted together with wedge bolts. A significant difference is that the insulation is to be applied in the field to facilitate erection and fastening of the panels.

A foundation is to be poured of accelerated concrete within standardized forms. The standard wall panels are to be erected in eight hours by four men. All millwork, accessories, and the like are to be hoisted over the walls with a crane before the flat roof of similar panels is applied. The top of the roof is to be covered with aluminum foil for insulation. Finish of floors will be linoleum or laminated wood attached to two inches of insulation and applied to the metal surfaces with mastic. The entire construction is dry. Panels are prepainted with two coats in the shop, buttered, and bolted in place. A final coat of paint is applied in the field. The plans are good, the elevations not unattractive.

The Fisher house fails to meet some of the criteria although it is a long step forward. The standardized foundation forms encounter the same objections as those proposed by Edison although in less degree as they cover less of the house. Transport of the gasoline crane makes rural construction difficult.

There are two more serious, less easily overcome objections. The bulk of competent authority, particularly in Britain, seriously doubts whether thin steel plates will withstand weathering for any length of time. Experience indicates that a little water creeps in around the joints, rust starts there and progresses inwards. The outside faces of the plates may be preserved by rather frequent painting but it is hard, if not impossible, thus to protect the joints and the inner side (*Continued on page 156*)

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THE QUEST FOR A BETTER HOUSE

(*Continued from page 154*)

behind the joint. Leakage through these joints is an ever-present menace. Flexible mastic is of doubtful durability. The slightest loss of resiliency will open cracks and pave the way to leaks, the greatest bane of the house builder or owner.

Other similar schemes have been proposed and two houses have been built near Cleveland, one with porcelain finish on the metal panels or shingles (see page 128). They are open to the same objections as the Fisher scheme.

There is much of merit in the General Houses proposal, however, and Fisher deserves credit for so careful a working out of detail and for focussing the spotlight on his own endeavor. The difficulties I have pointed out, however, plus the failure on actual trial of several similar, almost identical proposals, cause me to doubt that the present Fisher solution is adequate.

Another interesting house which, for want of a better place, may be located in this group is the "Aluminaire" house (see page 129). One of these houses, designed by A. Lawrence Kocher, '13, and Albert Frey, both serious students of housing, has been built at Syosset. These men present a rather revolutionary plan — in my opinion too much so. For example, there are to be no windows in the north wall, a sound engineering conclusion, but a radical departure. The house is not ugly to any one who can look modernism in the eye, but the battle with tradition is scarcely recognized in a proposal of this type. The house is cellarless. Six five-inch aluminum tubes carry all of the weight, the walls being entirely non-bearing. Steel channels support steel battledeck floors with insulating board and aluminum covering. The stairway is of steel, the treads surfaced with linoleum. The walls have a light steel framework and an insulating board covering. Over this is water-proofing and finally corrugated aluminum fastened with screws and washers. The inner wall facing is of washable fabric. Most of the furniture is built in. There is no fireplace.

Undoubtedly many of the parts are susceptible of mass production. The frames offer difficulties of flexibility. The big obstacles are the revolutionary changes in living habits necessitated by this house, the old idea never substantiated by public dollar-support that "I-know-what-is-good-for-you-better-than-you-do," the doubt as to any economy in such a complicated built-up construction. Fully as much material is used as in any other house. Undoubtedly, there are minor savings in prepared linoleum and the like, but these could be effected in a traditional house. The proponents claim a cost of 25 cents a cubic foot on a mass-production basis which seems over-optimistic. None the less the effort is interesting.

The Left Wing

In every movement of any significance there is a left wing — usually young, fresh, impetuous, and intolerant. Sometimes it has something to offer; always it is a necessary stimulant to "reactionaries" to look alive. No consideration of the efforts to solve the problems of housing structure is complete without consideration of the proposals of this group. It is unfortunate that the President's Conference on Home Building and Home Ownership apparently made no real effort to record the views of these pioneers although it was seriously beguiled by the potentialities of that old war horse, *pisé-de-terre* (rammed earth).

Of all of the radicals in house design, the trenchant post-Nietzschean pen of Buckminster Fuller uses ink most freely and has been farthest spread throughout the land. For some years now he has been going up and down the country demonstrating models of his Dymaxion house (see page 130).

Fuller has laid hold of two important principles. He was probably the first to propose in the field of housing that steel members are much more efficient in tension than in compression. Hence he advocates scrapping all the old ideas of compression as the governing factor in house structural design and substituting tension or suspension. His second basic principle, perhaps also acceptable, is that there are two elements in a house: one the housing of utilities and accessories, the other the housing of people. The first he says must be strong, well protected, and delicately adjusted; the second should be light, free, and more or less temporary. His proposal goes on from these sound principles to a welter of details largely unrelated except that none are traditional.

On this basis, then, he erects a large central mast of duralumin, anchored to the ground with guy wires and with three floor beams of each deck suspended from the mast. The light hexagonal frame of the house (the entire structure is based on triangulation) is then fastened from the mast and to the ground by wires, triangular floor plates are attached to central mast and to frame by wire in tension, and then the wires are all tightened by turnbuckles, making a rigid framework. The central mast houses the utilities and the elevator. There is no ground floor, the lower space being used for a garage.

From this point on Fuller goes into abstractions, nebulous concrete applications, or drastic changes in planning which do not make any concession to tradition. Rooms are either parallelograms or triangles. Heavy furnishings are all located near the mast. Floors are pneumatic, doors work by compressed air so as not to jam the child's fingers. Windows are of double-paned casein and are never opened. In fact, all air is brought into the house through the mast and conditioned therein. Temperature conditions are so equable that one does not have to wear any clothes.

It would bespeak more sincerity for Fuller's purpose if he had spent less time in developing a series of interesting gadgets and more in actually producing a house. For, strange as it may seem, although he has been displaying his models for several years, the world has yet to see a full-scale Dymaxion house.

Let us now apply the criteria to the Fuller project. We can see some difficulties in erecting Dymaxion houses on hilly sites. Wide variation of plan and elevation do not seem attainable. The hexagon is dictated by the construction. Moreover, the form of this building, while very attractive, is so distinctive as not to lend itself to mass æsthetics. As a (*Concluded on page 158*)

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THE QUEST FOR A BETTER HOUSE

(*Concluded from page 156*)

matter of fact, a dull rectangular box form is much more attractive in monotonous repetition than some outstandingly unique form, be it never so beautiful. There is no way of telling whether or not erection would be simple. It does not appear so. The parts are light enough for wide shipment. The house does go far beyond structure and is a completed whole. It should be noted at once, however, that so many of the things proposed are entirely untested and so unconventional that there is no way of telling whether or not they would be successful. A pertinent example is the double casein hollow vacuum window. Finish and appearance are a complete departure from tradition. Fuller defines the life in his house, a life far different than you or I know, and one that I, at least, do not want to try to live.

The problem is solved by eliminating most of the conditions. Tradition is to be completely forgotten. Houses are to be placed far away from urban restrictions. Finally, Fuller says that on a mass-production basis a whole five-room house weighing 6,000 pounds would sell for 25 cents a pound, or $1,500 for the whole. There is no proof. We have his word and many others have said the same. It is truly remarkable the way a quarter sticks in everybody's mind as the unit price. We suspect it of being an *a priori* quarter.

These left-wing ideas have been carried further and more substantially in what seems to me the most complete and serious study yet made and published. This is the proposal by Irving Bowman which he calls "An Approach to Industrial Housing" (see page 129). The Bowman approach, too, is revolutionary. It takes account of the two real Fuller principles. It seems probable that a complete Bowman house could actually be built now. A serious effort has been made to design details for existing materials which can readily and economically be obtained and with which there has been previous experience.

The basement is omitted in the Bowman house. The laundry, heating equipment, and garage are placed on the ground floor. The bedrooms are small, adequate only for sleeping, and the living-room is correspondingly larger. The mast of Fuller is replaced by a circular central stair well, made in the factory. After the stair tower has been erected, lightweight steel trusses are supported on its walls and, projecting therefrom, support as cantilevers a set of suspended mullions in the exterior wall. These mullions are small channels; they are tied together by spandrel channels which, with the walls of the stair well, support the floor.

The floor units are sheet metal with a web system spot-welded to top and bottom sheet metal plates, 12 inches wide, 28 feet long and 6 inches deep. Board-form mineral wool with a phenol composition surface is used for fire-proofing. This is hung from the bottom plate of the floor units by bolts. The sub-floor has insulation board beneath the finish linoleum or wood. The roof and bottom floor units are filled between bottom and top plates with lightweight aerated concrete. The second floor is left hollow for heating and ventilating ducts.

The wall units are 20-gauge steel, stamped into 6-foot x 4-foot sizes, with channel flanges top and bottom. Behind this plate is a 3-inch aerated cement slab cemented to the metal. This is covered inside with decorator's muslin and painted. The exterior joints between the panels are filled with elaterite. Interior partitions are light insulating boards with phenolic resin finishes.

Bowman Brothers have designed some attractive combinations based on these principles. Their house is free from the imputation of insincerity, but it suffers the major defects of the Fuller scheme. It is non-traditional as to looks and comforts, although windows can be opened and doors are the usual thing. The exterior joints have the same weakness as those of Fisher. The supporting trusses and the stair well suggest lack of economical flexibility for all sizes of homes, but perhaps the authors have in mind only small homes for the lower-income groups. Erection is not indicated as very rapid. As a matter of fact, the Bowman house seems to me to offer no such immediate solution as Fisher's. Economy is not patent on the surface.

The Bowman house, however, is an encouraging sign. I imagine its designers do not think it a final solution any more than I do. Better than I, they probably recognize its inherent weaknesses. The significant thing here is that the designers, instead of starting with a lot of preconceived notions or bright ideas obtained while walking down the street, have thoroughly studied the problem before putting hand to paper. They have examined the difficulties and evidently decided they are not unsurmountable. It is in the attitude rather than in the result that their achievement must be judged noteworthy.

Many other people are working secretly at the present time, and some one of them may have hit upon the perfect solution. I believe it will not lie in any of the approaches discussed, although of these something along the line of the pre-made panel of metal seems to offer most promise. Progress has been made in that serious consideration is now apparently being given. The millennium is not at hand. There will be no 25-cent unit houses next week or next year. But the next decade may well be fruitful.

One thing is perfectly clear to me. Heretofore there have been many, many uncorrelated endeavors, often obstinately repeating the failures of previous times without any change sufficient to warrant optimism about overcoming the causes of those failures. People work far too independently. A central research body is really needed, a central basis of planning is equally dictated. If all of the important factors who are trying to work out these results independently could but agree on standards of goal and meanwhile standards of dimensions on which all might work, then it is undoubtedly true that the achievement of one man could often be dovetailed to that of another and the final result might be hastened. We are not here trying to make something fly or run with a gas motor. Here we have to produce an entirely new product that will replace an old and, on the whole, well-liked one. Crudities in pioneering efforts will not be tolerated by the purchaser and the successful man must present to this potential market a glorious house, sprung in full regalia from the joint effort of his own mind and that of many others.

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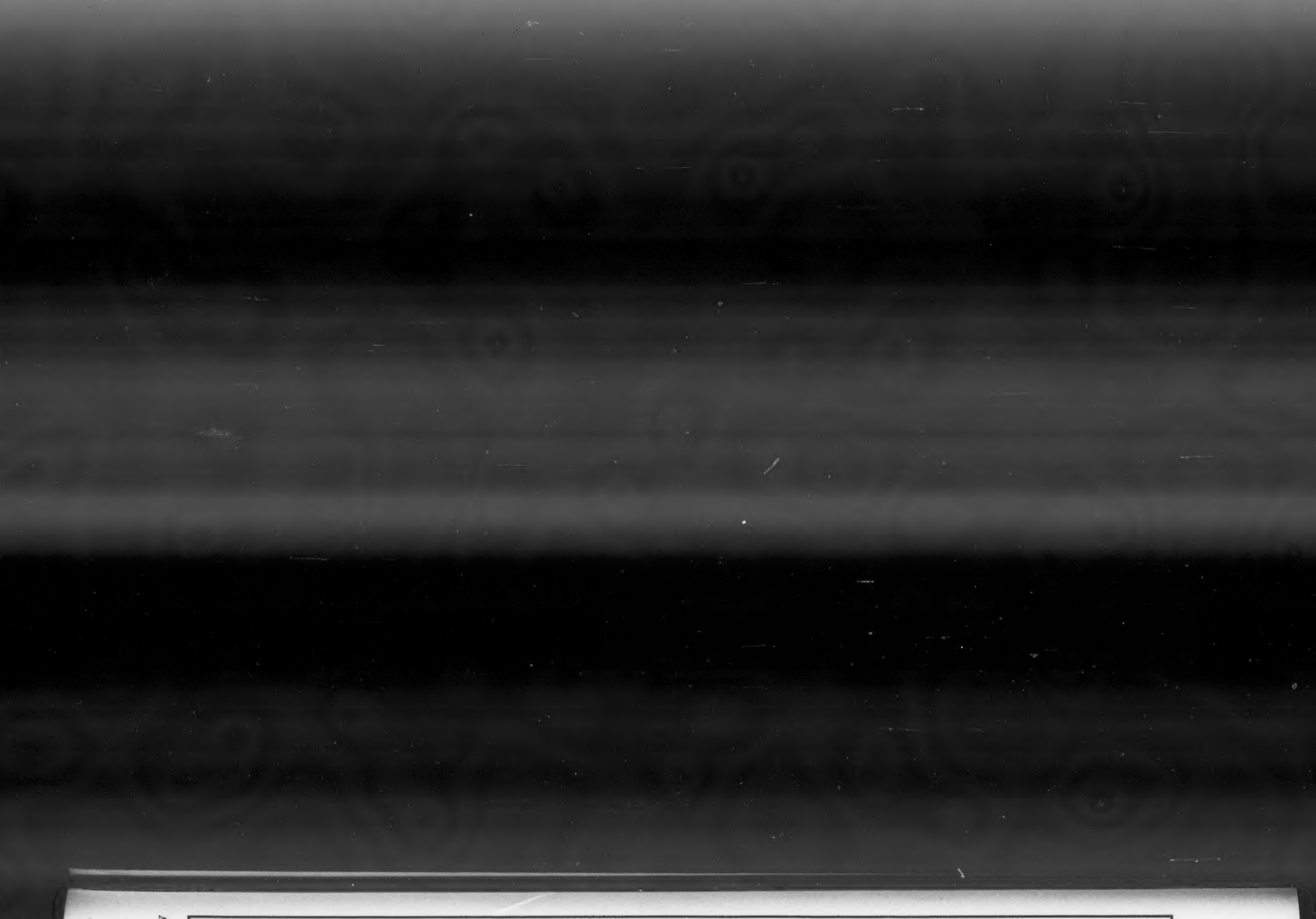

M. I. T. NEWS BULLETIN

PREPARED BY JOHN J. ROWLANDS, DIRECTOR, INSTITUTE NEWS SERVICE

Spinors

The newspapers on November 28 contained an announcement of the work of Professor Albert Einstein and involved spinors.

The notion of spinors, based on the work of Professor Dirac of Cambridge University, was first introduced by Professor B. L. Van der Waerden of the University of Leipzig. The name was suggested by Professor P. Ehrenfest of Leiden, well known in this country for a series of lectures which he delivered several years ago in Cambridge.

The mathematical theory received its main development in a series of lectures given at Technology in 1930 by Professor J. A. Schouten of the Delft Institute of Technology. Professor Schouten's presentation of this subject here was due in great part to the interest in similar questions of Professor D. J. Struik, of the Department of Mathematics.

These ideas, presented in lecture form for the first time by Professor Schouten, were published in the *Journal of Mathematics and Physics* at the Institute in December, 1931.

The spinor theory is an outgrowth of the attempt to apply the tensor methods characteristic of relativity to the spinning electron of Dirac. The problem offered immense difficulties, and many attempts had been made to solve it, some of them here at the Institute. Professor Schouten deserves credit for the first completely successful piece of work in this direction. Since his return to Delft, he has done much to develop the Einstein generalized field theory into a complete mathematical, harmonious whole.

The Compton Cup for Rowing

Appropriately named for Dr. Karl Taylor Compton as an honorary alumnus of Harvard University, former Head of the Physics Department of Princeton University, and President of Technology, a handsome trophy cup of old English silver has been given by the student body of the Institute to perpetuate an annual crew race between the three schools.

Culminating two years of endeavor to establish this race as a permanent event in the spring rowing season, the Compton cup will first be placed in competition in a race on the Charles on April 29. Dr. Compton will receive the trophy from the President of the Institute student body on the night before the race, and will personally present it to the winning crew the following afternoon. In addition to the cup, there will be a complement of some form not yet decided, on which will be recorded the particulars of each race.

The cup, which was obtained from the Rodman Wanamaker collection, was made in 1840 and used as a trophy at that time. It is of solid silver and, with the lid, stands 18 inches high and weighs 112 ounces.

Arrangements for the annual race were made by William J. Bingham for Harvard, Dr. Duncan Spaeth for Princeton, and Dr. Allan W. Rowe '01 for Technology.

Two years ago the three crews rowed on the Charles with the understanding that the race would be repeated the following spring at Princeton. During the past season Harvard was unable to arrange the trip, and the race was a dual one between Technology and Princeton. Next spring the race again becomes a triangular affair, and will continue so in the future.

The race will be of one and three-fourths to two miles and will be held in alternate years at Cambridge and Princeton. Each year the cup will be held by the winning crew, which will again place it in competition the following spring.

The presentation of this cup by the Technology student body is of special significance in view of the fact that a trophy of such value is seldom given by other than an individual. The Compton Cup is the latest of a series presented for similar purposes. Other trophies recently placed in competition are the Childs' Cup, the Carnegie Cup, and the Charles Francis Adams Cup for the Harvard, Navy, and Pennsylvania race.

Although Technology was one of the later schools to enter the rowing game, interest in the sport has risen steadily since its introduction. When rowing was relatively new at the Institute, other schools were cordial in welcoming the newcomer to participate in what had hitherto been dual meets. Within the past few years the number of triangular races has increased, and the presentation of this latest cup makes still more secure the position of the three-cornered meet.

From Edison's Library

An annotated volume from the library of the late Thomas A. Edison has been presented to the Institute by Charles Edison, son of the noted inventor and a former student at Technology. The book is a copy of Paul Sabatier's "Catalysis in Organic Chemistry," translated into English by E. Emmet Reid.

Numerous underscorings and a marginal comment in Mr. Edison's own handwriting are considered particularly significant in the light of the scientist's interest in organic chemistry during the latter years of his career. He devoted much effort at this time to the search for new methods of producing plant rubber.

Sabatier, author of the volume, was awarded the Nobel prize in chemistry in 1912, and in 1915 received the Davy medal of the Royal Society of London.

The following annotation by Mr. Edison occurs in an extension of the theory of catalysis by Professor Wilder D. Bancroft, chairman of the Committee on Catalysis of the National Research Council, which was added to the book by the translator:

"Perhaps it's the striking of the light molecules against the comparatively large mass of the catalyzer produces heat; the catalyzers being finely divided, don't conduct readily — it's like Welsbach mantle which if dense is N.G."

The volume, in a morocco case marked "From the library of Thomas A. Edison," will be added to the Rare Book Collection of the Vail Library.

Autograph letters from Mr. Edison and from the Edison medalists are also being collected in the Institute library by Mrs. Katherine Maynard. Beginning with Elihu Thomson in 1909 and continuing to E. W. Rice, Jr., in 1931, there have been 21 recipients of the Edison medal, which is considered the highest honor in electrical engineering in this country.

Research in Ceramics

Research in ceramics, now being carried on in the Institute's Division of Industrial Coöperation by Professor Frederick H. Norton '18, was described as throwing new light on an old industry in an interesting article by E. Bigelow Thompson in the Boston *Transcript* of November 3.

Contrasting modern ceramic methods with the early days of the industry in New England, the article said in part:

"What is going on at Technology in this Division of Industrial Coöperation is a far cry from the ancient days of the potter at his wheel, the rule-of-thumb procedure in firing and glazing, and the individual craftsmanship which make examples of his art museum pieces. The wooden wheel on which he 'threw' his clay has given way to a bronze disc, and foot power to controlled speed from high power electric cables.

"In the atmosphere of scientific research associated with the institution, hit-or-miss procedure has been supplanted by patient research and the reduction of processes to accurate formulæ in the whole range from analysis of the base clay to firing, coloring, and glazing. Yet science has not approached this world-

old craft with all emphasis on modern day efficiency. With meticulous study of chemistry of New England clays, the Institute has captured much of the old artistry in making equally obvious to visitors that the work which Professor Norton is doing in this field has the flair of the artist's studio indelibly stamped on the final result."

Mention was made of the small but excellent collection of New England folk pottery which Professor Norton has gradually assembled.

"Curiously, research in this department has resulted, too, in establishing the nucleus of a collection of folk pottery of New England, Americana consisting of typical pieces from all the old New England potteries, for which plans are now being made to construct a museum where the collection may be displayed in fitting manner. . . .

"In the collection are early examples of glass; tiles from the San Diego mission, erected in 1769; pottery of J. and J. G. Low, known to collectors; bean pots and lard jars; several good examples of stoneware; a pickle jar from Gonic, N. H.; Grueby tiles of artistic excellence; Bennington ware, white porcelain with blue decoration and the distinguishing clusters of grapes, and a number of representative modern pieces."

Summing up the aims of Technology's research in ceramics, the article concluded:

"What this (early) equipment, plus the knowledge of the craftsmen, was able to produce in the manufacture of a type of ware which is really this nation's most representative folk pottery, Technology in its department of ceramics is charting for this economic-scientific age. With modern machinery, the exact knowledge of chemistry and physics, the photospectroscope for measurement of color, it is reducing the 'art' to definite formulæ for the student specializing in this field and for the manufacturer desiring to improve or extend his business by modern methods."

Notes from the President's Office

President Compton and Vice-President Bush were among those invited by the National Academy of Sciences to deliver technical papers at the autumn meeting in Ann Arbor, Mich., on November 14, 15, and 16.

In an "Interpretation of Phenomena Due to Accommodation Coefficient of Ions at Cathode Surfaces," Dr. Compton described certain new studies of metal targets bombarded by high-speed ions in tubes of the x-ray type. Dr. Bush discussed some recent developments of the differential analyzer, the unique machine devised by him some time ago for solving differential equations.

From Ann Arbor, Dean Bush went to Detroit, where he was guest speaker at a large meeting of the Technology Association. In his address, Dr. Bush described the plan by which members of the Institute faculty last year provided temporary work for 41 unemployed graduates. He also commented on the new admission ruling under which applicants graduated in the upper fifth of their classes in accredited schools may now enter Technology without examinations. John H. Little '23, President of the Association, presided at the meeting.

Dr. Compton proceeded from Ann Arbor to Schenectady, N. Y., where on November 18 he delivered the seventh annual Steinmetz Memorial lecture, under the joint auspices of Union College and the Schenectady Section of the American Institute of Electrical Engineers.

Under title of "The Battle of the Alchemists," Dr. Compton related the absorbing history of man's efforts to transmute the elements. He traced the war of science against the dogged integrity of the atom, from the secret arts attributed to mythical gods and fallen angels to the achievements of that modern alchemist, the physicist.

Artificial transmutation of elements has actually been achieved in three distinct ways, Dr. Compton said, and he described the notable methods recently devised by Rutherford, Chadwick, and Cockroft and Walton. He stressed the significance of the high voltage generator now being built for the Institute by Dr. Robert J. Van de Graaff, as a new weapon in the physicists' assault on the atom. Dr. Compton's entire address is presented in this issue of The Review.

Dr. and Mrs. Compton on November 11 were guests at the inauguration of Dr. Stanley King as President of Amherst College.

On November 25 and 26, President Compton attended sessions of the American Physical Society in New York City. Two days later he addressed the Cambridge League of Women Voters on the subject "To What Extent Can Employment be Stabilized by Law?"

Industrial Progress in China

A glimpse of the new technology which is revolutionizing Chinese manufacture and industrial education was revealed by Tsu-Kang Hsueh '24, Assistant Manager of the large Yung Tai Silk Filature mills at Wusih, near Shanghai, during a brief visit to the Institute in November.

The Yung Tai mills, according to Mr. Hsueh, were the first in China to introduce the slow-motion principle in the reeling of raw silk from the cocoon. Mr. Hsueh was personally responsible for the design and installation of the necessary machinery. By means of the new device the excessive reeling speed, which previously allowed imperfections to escape observation, is reduced from approximately 500 to 80 feet per minute. At the same time, the number of threads tended by each girl operator is increased from five to between 20 and 30.

The extent to which advanced Chinese industrialists are applying modern principles in their business was indicated by Mr. Hsueh's statement that his firm required all prospective girl workers to pass an intelligence test. Further efforts to eliminate labor turnover take the form of evening classes in elementary subjects conducted for the mills' 2,000 employees. Girl workers are housed in dormitories equipped with modern sanitary facilities, considered luxurious in China, and every provision is made for their comfort and amusement, even to a running track and gymnasia.

Mr. Hsueh received the degree of bachelor of science at Technology in 1924, after completing both the courses in Mechanical Engineering and Business and Engineering Administration in three years.

Elected to Tau Beta Pi

Announcement was made in November of the election of Kenneth C. Reynolds '25, Assistant Professor of Hydraulics at the Institute, to membership in the Tufts College Chapter of Tau Beta Pi, national honorary fraternity for engineers. The initiation ceremonies and banquet were held on November 30 at the Commander Hotel in Cambridge. Election to membership in Tau Beta Pi is considered one of the highest distinctions in the engineering field.

Professor Reynolds was graduated from the Engineering School of Tufts College with high honors in 1919, and in 1925 received the degree of master of science at Technology. He has been a member of the staff at the Institute since 1920.

From 1927 to 1929 Professor Reynolds made a study of river hydraulic laboratories in Europe as a John R. Freeman Traveling Fellow of the Boston Society of Civil Engineers. Since his return, he has directed river hydraulic research at Technology.

He is a member of the Boston Society of Civil Engineers, and an associate member of the American Society of Civil Engineers. He is also Secretary of the Finance Committee of The Emergency Planning and Research Bureau, Inc., an organization sponsored by the Engineering Societies of Boston to provide temporary employment for engineers and architects during the depression.

Society of Arts Lectures

Cosmic radiation, which has been the subject of world-wide scientific study during the past few months, was discussed in the first of the annual Popular Science Lectures held under the auspices of the Society of Arts at the Institute on December 11.

Professor Ralph D. Bennett of the Department of Electrical Engineering, who recently returned from an intensive study of cosmic radiation in Alaska and the Rocky Mountains, spoke on "Cosmic Rays — the Mystery of Modern Physics," illustrating his lecture with striking experiments.

Professor Bennett's recent investigations were made in conjunction with the international study conducted by Dr. Arthur H. Compton for the Carnegie Institute of Washington.

ADVERSARIA

Congratulations

¶ To Charles H. Woodbury '86, for winning the Edwin Palmer Memorial prize of $1,000 for his painting, "The Changing Wind," awarded by the National Academy of Design.

¶ To George E. Hale '90, for receiving the Copley Medal, highest distinction given by England for scientific research, from the Royal Society of London, for researches in the magnetic fields of the sun. Benjamin Franklin was the first American to receive this honor for his "curious experiments and observations on electricity."

¶ To Gerard Swope '95, on being admitted to membership in Tau Beta Pi, national honorary engineering fraternity, by the Technology chapter.

¶ To Harry B. Pulsifer '03, on his appointment as Secretary of the Cleveland Chapter of the American Society for Steel Treating for the year 1932–1933.

¶ To Clyde MacCornack '03, on his election as first Vice-President, American Institute of Steel Construction. Charles N. Fitts '91, retired as President after four years of service.

¶ To James I. Banash '06, on his election to the Presidency of the National Safety Council.

¶ To Roland P. Davis '06, on his appointment as Dean of the College of Engineering at West Virginia University.

¶ To Thomas C. Desmond '09, Republican, on his reëlection to the Senate of the State of New York. Writes the Newburgh *News:* "The magnificent vote received by Senator Desmond attests the people's confidence in him and their appreciation of his services to his district and the State. . . ."

¶ To Philip S. Avery '11, for winning honorable mention at the Sixth Annual Small House Exhibit of the *House Beautiful* magazine, held in Boston in November, in the class for houses costing less than $10,000, against the competition of architects from 25 states and Hawaii.

¶ To Porter H. Adams '14, on his election to the Senate of the State of Vermont.

¶ To Hovey T. Freeman '16, for becoming President of six large insurance companies on the death of his father, John R. Freeman '76.

¶ To Judge James W. Doon '17, on his election to the New Hampshire House of Representatives.

¶ Kenneth C. Reynolds '25, on his election to Tau Beta Pi. (See News Bulletin on page 11.)

In the News

¶ Maria A. Sheldon '81, for having given to Deerfield (Mass.) Academy $100,000 to be used for a new science building in memory of her father, the late George Albert Arms.

¶ Willis R. Whitney '90, William D. Coolidge '96, for being honored with a luncheon sponsored by the four business men's clubs of Schenectady.

¶ Charles G. Abbot '94, Secretary, Smithsonian Institution, for his invention of a simplified and improved instrument to measure the sun's heat changes, called the double water-flow pyrheliometer.

¶ John B. Taylor '97, for his invention "narrowcasting," popularly known as the "talking light beam." Sounds caught by microphone are amplified, changed into electrical impulses, and synchronized with light waves projected by searchlight. A photoelectric cell in front of a mirror-receiver changes these electrical impulses carried by the light beam back into sounds of speech.

¶ Burt R. Rickards '99, State Health Director, for experiments undertaken to see how carbon monoxide gas works, to be used in a pamphlet of the State Labor Department containing instructions for avoiding the gas. He reports that within a minute he felt a metallic taste in his mouth and became dizzy and drowsy.

¶ William A. Adams '08, for being elected President of the American Club in Shanghai in October.

¶ Lewis W. Waters '10, Vice-President of General Foods Corporation, for being guest speaker at the meeting of the Boston Advertising Club on November 22. Speaking on "Science Sets the Table," he reviewed the progress made in food research and its influence on the national diet. — And also because he expressed the opinion in the New York *Times* of November 27 that while research in some 1,700 industrial laboratories in the United States (there were only 200 ten years ago) is speeding the obsolescence of plants, it also presents new products and methods that more than compensate for the heavier depreciation charges necessary. At present, American inventors are applying for patents at the rate of more than 1,000 a week.

¶ James A. Tobey '15, because in his article in *Current History* for December, he disagrees with Secretary Wilbur for having said at the National Conference of Social Work in May that the depression was more beneficial than harmful to the American child due to more normal living conditions in the homes, for with prosperity parents tend to leave the responsibility of children to others. Dr. Tobey pleads for the support of public health associations, expressing alarm that the customary supervision of children has been relaxed to a dangerous degree.

¶ James H. Doolittle '24, holder of the world's land plane record of 296 miles an hour, because of his proposed nation-wide tour in which he plans to fly 9,000 miles in six days, averaging some 230 miles an hour during daylight.

Written

¶ By Henry G. Pearson, Head of the Department of English and History, a book, entitled "Son of New England, James Jackson Storrow, 1864–1926."

¶ By Edward C. Harwood, Assistant Professor of Military Science and Tactics, a book, entitled "Cause and Control of the Business Cycle," published by the Financial Publishing Company.

¶ By Frederick G. Fassett, Jr., and Paul C. Eaton '27, of the Department of English, two books published by Houghton Mifflin: "Practical Writing" and "Studies in Reading."

¶ By Oswald C. Hering '97, a book entitled "Down the World," published by Robert M. McBride and Company. (See class notes for review of book.)

¶ By Allan W. Rowe '01, a book entitled "The Differential Diagnosis of Endocrine Disorders" published by Williams and Wilkins Company, Baltimore.

¶ By Irving H. Cowdrey '05, an address on "Pictures Along the New England Coast," delivered before the Unitarian Layman's League of Roxbury.

¶ By Herbert M. Wilcox '05, a paper on the "Development and Use of Talking Motion Pictures," delivered before the Franklin Institute, Philadelphia.

¶ By Ralph G. Hudson '07, a book entitled "Electronics," published by John Wiley and Sons, Inc.

Announcement

¶ Morris Knowles, Inc., announces the renewal of the association with their organization of Maurice R. Scharff '09, consulting engineer of Pittsburgh and New York. For many years Mr. Scharff was with the late Morris Knowles '91 as President and Assistant Chief Engineer.

Deaths

¶ Benjamin T. Prescott '70, on November 27, following an illness of some duration.

¶ Frank H. Beebe '78, on November 20.

¶ Willard W. Estabrook '89, on December 3.

¶ Bowen B. Smith '90, on October 27.

¶ John O. Dewolf '90, on November 17.

¶ Morris Knowles '91, on November 8. (See class notes for account, also notes of the Western Pennsylvania Club.)

¶ Milton F. Jones '94, on November 30.

¶ Alfred N. Fessenden '99, on November 11.

¶ David Collins '05, on November 26.

¶ Paul R. Williamson '12, in June. (See class notes for account.)

¶ Raymond O. Elcock '13, on November 1.

¶ Fearing H. Morris '22, on October 16.

¶ Nathan Ginsburg '24, on November 24.

¶ Henry Bridge '30, on November 25.

NEWS FROM THE CLUBS AND CLASSES

CLUB NOTES

The M. I. T. Club of Western Pennsylvania

Dr. Vannevar Bush, Vice-President of the Institute and Dean of the School of Engineering, was the guest of the Club on November 3, at the first dinner meeting of the 1932–1933 season, held in the University Club, Pittsburgh. An informal luncheon for Dr. Bush was also held on the same day by a number of the alumni. Dr. Thomas S. Baker, President of the Carnegie Institute of Technology, and Chancellor John G. Bowman, of the University of Pittsburgh, were our guests at this luncheon. Another representative of Pittsburgh's universities was Professor Elmer A. Holbrook, Dean of the School of Engineering and Mines of the University of Pittsburgh, and a member of the Class of '04, of M. I. T.

At the evening meeting, Dr. Bush addressed the Club on the administrative, undergraduate, and alumni activities of the Institute. Referring to the Institute's new form of organization, he explained the division into schools and departments, the improved distribution of responsibilities, and the plan of future development. He discussed the number of items entering into the total annual costs of academic institutions, and the relation of these costs to income from tuition and other sources. M. I. T. has been successful, he explained, in keeping a fairly good balance between expenditures and income, despite the economies made necessary by the effects of the depression. The use of a carefully prepared budget as a guide has helped to make this possible.

Dr. Bush traced the growth of the Institute's registration over a period of years, pointing out the fluctuations after the War. Such fluctuations impose serious difficulties on a school, so that the need for a stabilized registration becomes more apparent. An analysis of the present student statistics, said Dr. Bush, indicates that the registration is about in line with the long-time trend. In its requirements for admission, however, the Institute looks not to large registrations, but to the selection of students of ability and sincerity. A recently developed system of grading the men in their studies is proving effective as a stimulus to good scholarship. It is in the recommendation to the Institute of capable students from their territory, that the alumni may be of great assistance, Dr. Bush stated.

Asked about the status of the proposed alumni reorganization, Dr. Bush replied that a vote of the general alumni body will be taken next spring. The salient feature of the new reorganization plan is geographical representation on the nominating committee. To provide against the contingency that such a committee may find it difficult to function, it is proposed to suspend, rather than to set aside entirely, the present nominating committee and the present constitution.

The M. I. T. Club of Western Pennsylvania wishes to take this opportunity of expressing in these columns its appreciation of the visits of staff members to our more or less remote fastnesses at the juncture of the Allegheny and Monongahela Rivers. On November 3, we "discovered" Dr. Bush, and we are happy to say we like him. It has been through such visits that we have also "discovered" Dr. Compton, Colonel Locke, Professor Waterhouse, and Dr. Tryon, with equally gratifying results.

We regret to announce the death of one of the favorite members of this Club, Morris Knowles, '91. Mr. Knowles was President and Chief Engineer of the firm bearing his name. An engineer of national repute, Mr. Knowles' active career was of wide scope. During the War, he was Supervising Engineer of Camps Meade and McClellan; in 1918, he was Chief Engineer of the Housing Division of the United States Shipping Board; he was formerly on the Massachusetts State Board of Health, the Massachusetts Metropolitan Water Commission, the Board of Advisory Engineers of the Miami Conservancy District, the Engineering Board of Review of the Chicago Sanitary District, and on the United States Department of Commerce Zoning Commission. The Essex Border Utilities Commission, Ontario, Canada, retained him as Consulting Engineer. In the case of Connecticut versus Massachusetts, before the United States Supreme Court (1928–1930), Mr. Knowles was consultant and advisor to the Attorney General of Connecticut. He was the best-known Pittsburgh engineer because of his municipal work, which included the design and supervision of construction of the Pittsburgh filtration system. Always interested in M. I. T., Mr. Knowles was a Term Member of the Corporation from 1924 to 1929. — SAMUEL J. HELFMAN '24, *Secretary*, Duquesne Light Company, Pittsburgh, Pa.

Detroit Technology Association

Our first meeting of the 1932–1933 season was held October 5 at the University Club. The good turnout enjoyed an informal discussion of current conditions. At this meeting it was decided that we should renew for the ensuing year our subscription to The Technology Review for the Northwestern High School and the Cass Technical High School. The principals of both schools had reported that the magazine is a help in their work.

At this meeting it was also decided that your Secretary attach to our monthly letter a list of the qualifications of any unemployed M. I. T. men in this territory who care to send in such qualifications. It was felt that this service might help in finding openings. Such facts as class, course, previous experience, and residence should be given.

Our Speaker's Committee started off with a bang! They are going to try and keep the same pace established last year. On Tuesday evening, November 1, we met at the Metropolitan Motion Picture Company, 1745 East Grand Boulevard. At 6:30 we all went over to the Peter Pan Tea Room next door and had supper. We enjoyed a fine, home-cooked chicken dinner with all the accessories. At eight o'clock we returned to the studio and had a general tour and inspection, which showed us how sound is put on the film, and how pictures are taken, developed, and printed. After this, there was a showing of various industrial pictures, such as the Kelvinator picture; the Fouth Milestone, a Plymouth picture; a new Stewart-Warner picture just recently produced by Metropolitan; pictures of the Olympic Games on the new 16 mm. portable projector, which was recently developed by RCA; and also a demonstration of slide films with sound. In addition to this, we showed the Community Fund picture which our own Charles Campbell was instrumental in developing and furthering. We also showed pictures taken at Cranbrook during our most delightful reception for Dr. Compton last July.

We have word that Dr. Allan W. Rowe, President of the Alumni Association, will be here sometime in February, 1933. All those who have heard Dr. Rowe will want to hear him again and those who haven't heard him have a new treat coming. He's a most interesting talker. — Our annual dues are again payable. As in the past the due amount is optional. We need everyone's support this year. — JOHN E. LONGYEAR '26, *Secretary*, 2000 Second Avenue, Detroit, Mich.

CLASS NOTES

1883

Harvey Chase has published his statistics for the National Economy League. He has done a fine job. Those who have not received a copy are advised either to write to him or the League, at 43 Federal Street, Boston, for the same. He has shown both by figures and by graphs how the cost of government in this country has been climbing in recent years. It is enough to make anyone sympathize with the Irishman who, when cast on a desert

1883 Continued

island, said he was "again the government regardless of what government they had there."

George Smith wrote on September 28, too late for the November issue of The Review: "I am sorry to be late in replying to your card but we are at our summer place which means a trip back and forth every day for me which takes considerable time from the day and an early start (about seven) in the morning, necessitating going to bed early. It is well worth it, however, to be down there part of the afternoon. Have been going to business regularly, except a few days, all summer, and have been on no cruises since 1929. Present financial conditions don't warrant such luxuries.

"I fear I never wrote to you how much we enjoyed your account (in verse) of your trip with Mrs. Wesson to the West Indies, and so on. I put it aside to show a friend who is a great globe trotter, who was then away, I think, and I don't believe I remembered to show it to him when he got back. Well, I must! I suppose you are still concocting schemes to improve on the unwary diner at restaurants and making it so he will enjoy being imposed on. You know, during the War, it was reported that German chemists had succeeded in making sawdust into a viand that was edible and nourishing. I fear they did not succeed in making it palatable, for since the War they don't seem to be pushing it.

"Referring to the poem, I don't see how you could have learned poesy from any of our Tech courses, even Atkinson and I feel sure there was collusion or collaboration or something of that sort in its production. — Have seen nothing of the boys for a long time."

Capen, under date of September 30, writes: "I have been wondering since I received your card, what notes of interest I could write you. I have been trying to recover from serious financial affairs that lighted on me a few years ago, and the hard times of business have not helped me any lately, but I am still plugging."

The members of the Class will be sorry to hear that Mrs. George Underwood has been suffering for the last six months with a very serious attack of arthritis. From last accounts, however, she is well on the way to recovery. — DAVID WESSON, *Secretary*, 111 South Mountain Avenue, Montclair, N. J.

1887

No news has been received from any of the Class since the last letter to The Review with the exception of Frank E. Shepard, who writes from Denver expressing his regret at being unable to attend the Forty-Fifth Reunion in June last and renew old associations. He adds: "Give my kind regards to the Class of '87 and I will be glad to see any of them whenever they come this way."

Notice has been received of the deaths of Elbridge S. Carleton on October 10, and James E. R. Carpenter, IV, who died in New York City on June 11. — NATHANIEL T. VERY, *Secretary*, 66 Orne Street, Salem, Mass.

1889

George Russell died on September 29. The following account is from the New York *Times:* "George F. Russell, President and Treasurer of the Champion International Paper Company, died last evening of a heart attack at his home here after an illness of two years. He was 67 years old. A widow, the former Josephine G. Dearborn, survives. Mr. Russell, who, besides being a paper manufacturer, was chairman of the Board of Directors of the Merchants Trust Company of Lawrence and a director of the Seldon Worsted Mills, was born in Lawrence on June 30, 1865, the son of the late George W. Russell and the former Frances Osgood. He was graduated from Phillips Andover Academy in 1884 and was a member of the Class of '89 at the M. I. T. After leaving college, Mr. Russell became associated with the Russell Paper Company of Lawrence, which was founded by his family in 1842. With the formation of the International Paper Company and other manufacturing concerns, he became the agent of the Russell mills in that organization. He was responsible for the merging of the Champion Card and Paper Company of East Pepperell, Mass., and the Russell Paper Company under the name of the Champion International Company in 1901. A year later he became its President and Treasurer. Mr. Russell was a member of the Union, Algonquin, and Exchange Clubs of Boston.

Leon Abbott died on October 10. The following account of his life is from the Boston *Transcript:* "Leon M. Abbott, a member of the Boston legal firm of Abbott, Dane, Buffum and Howe, with offices at 73 Tremont Street, this city, died suddenly this morning at his home, 797 Washington Street, Brookline. Mr. Abbott was born at Richmond, N. H., August 28, 1867, and was the son of Joseph B. and Lydia C. (Martin) Abbott. He received his early education in the schools of Keene, N. H., and then went to the M. I. T., where he remained during the years 1885 and 1886. Mr. Abbott then attended Harvard College until 1887, when he entered the Harvard Law School, where he was graduated with the Class of 1890. Thereafter, beginning in 1891, Mr. Abbott continued the practice of his profession in this city. He was first a member of the firm of Abbott, Dane, Buffum and Howe. He was a trustee of the North End Savings Bank, and a member of the American Bar Association, the Massachusetts Bar Association, and the Bar Association of the City of Boston. He was a member of the Masonic fraternity, and was past grand master for Massachusetts and he had been sovereign grand commander of the Supreme Council of the 33d degree. He was a member of the Algonquin Club, the University Club, and the Charles River Country Club. His sole survivor is his wife, who was Florence M. Tallman of Boston, whom he married April 19, 1894."

Arthur Davis died on October 19. The New York *Herald-Tribune* carried the following notice: "Arthur Lincoln Davis, Vice-President of the American Bridge Company, with New York offices at 71 Broadway, died of heart disease yesterday in the Hotel Denis in Atlantic City, his family was informed last night. Mr. Davis, who was 66 years old, was taken ill Saturday while on a vacation trip with his wife, Mrs. Katie Macomber Davis. He lived at 276 Bedford Avenue, Mount Vernon, until a year ago, when he moved to Sewickley, Pa., a suburb of Pittsburgh. Born in San Francisco on August 17, 1866, the son of Henry L. and Susan Davis, Mr. Davis studied civil and mechanical engineering at the M. I. T., being graduated in 1889. His first position was with the Central Vermont Railroad, after which he joined the Vermont Construction Company of St. Albans, Vt., and later the East Berlin (Conn.) Iron Bridge Company, which was absorbed in 1900 by the American Bridge Company. He served for years as assistant to the late J. J. Hatfield, then President of the company, became contracting manager for the Eastern United States, and later general contracting manager for the nation. Mr. Davis was promoted to the Vice-Presidency a year ago, when the company moved its main offices to Pittsburgh, the site of its principal factories. Mr. Davis was a former director of the Huguenot Trust Company of New Rochelle, and a member of the Engineers Club, the Railroad Club of New York, and the Transportation Club. He was a former member of the Siwanoy Country Club of Bronxville. Surviving are three daughters: Mrs. Richard L. Freeman of Pawtucket, Mrs. Walter G. Abriel and Mrs. Marion D. Doyle, of Mount Vernon; a half-brother, Laurens G. Davis, and a half-sister, Mrs. Hillman Lueddeman, of Portland, Ore."

A daughter was born to Mr. and Mrs. Charles N. Borden on September 21 last. — Bosworth is now President of the University Club of Paris, which was formed last winter and is growing into one of the best clubs for young men in that city. Bosworth would like to get hold of some bird's-eye views of American Colleges to hang on the walls and wants to know where he can get them. His address is 198 Avenue Victor Hugo, Paris. His family now consists of two little girls. — WALTER H. KILHAM, *Secretary*, 9 Park Street, Boston, Mass.

1891

Our friend and classmate, Morris Knowles, passed away on November 8. While he has not been in good health for some time, we had hoped that he was getting better, and his death was a great shock to his host of friends.

His life was unusually full of action and usefulness. His reputation as a skilled workman was country wide, and his achievements in civil engineering will long be remembered.

He was deeply interested in Technology affairs, being President of the Associated Technology Clubs in 1914, and Vice-

1891 Continued

President of the Alumni Association in 1917. Also an alumni member of the Corporation.

The following brief summary of some of his activities clearly shows his usefulness. He gave freely of his time and energy, perhaps too much so for his own good, but we with an engineering training cannot help admiring a man whose life was so filled with work that was worth while. "Morris Knowles, civil engineer specializing in water and filtration systems, and a consultant for many cities and industrial concerns throughout the country, died of heart disease here today at his home. He was 63 years old. Mr. Knowles was a member of the Zoning Commission of the United States Department of Commerce, chairman of the committee on utilities during President Hoover's conference on home building and home ownership in 1931, chairman of the Pittsburgh City Planning Commission and of the Pittsburgh Board of Zoning Appeals.

"He was born in Lawrence, Mass., coming to Pittsburgh in 1897 as resident engineer of the Filtration Commission. From 1901 to 1910 he was chief engineer of the Pittsburgh Bureau of Filtration. He was a member of the Lawrence, Mass., Water Board, the Pittsburgh Flood Commission, and served on the boards of advisory engineers of the Miami Conservancy District and the Chicago Sanitary District.

"Mr. Knowles was chief engineer of the Essex Border Utilities Commission, Ontario, Canada. During the World War he was supervising engineer for Camps Meade and McClellan, and chief engineer of the housing division of the United States Shipping Board.

"Mr. Knowles, who was educated at the Massachusetts Institute of Technology, was appointed director of the Engineering Department at Pittsburgh University in 1929. He was President of Morris Knowles, Inc., and Morris Knowles, Ltd., a director of the Pittsburgh Aviation Industries Corporation, a member of the civic group of the United States Chamber of Commerce, the Pittsburgh and Pennsylvania State Chambers of Commerce, the American Institute of Consulting Engineers, and of numerous other engineering societies."

In the Class Book list of addresses unknown was Donald McDonald, and notice has come through from M. I. T. that he died December 14, 1916.

The Secretary and Mrs. Fiske are living in Winchester this winter with their daughter, Mrs. S. D. Howe, at 24 Symmes Road. It might be added that the two grandchildren, David, five years, and Barbara, three years, are keeping them busy.

Many fine letters have been received by our Assistant Secretary and the following extracts are of general interest:

Ed Smith sends in a most interesting letter from Greensboro, N. C., where he was attending the Textile Show in which his company participated. "This year the Show was more restricted and with fewer exhibits under power than usual. Some old timers were not there, and recourse was obviously had to 'stop gaps,' but some gaps were not stopped. Aesthetically, the Show was more attractive than usual, a managerial compensation for missing displays, without doubt. The Draper Corporation always stages a worthwhile and an attractive display, but even they curtailed their operating exhibits and devoted much space to parts and supplies. As usual, there were 'attractions' staged, but they possessed distinctly instructive qualities.

"In the section adjoining ours, G. E. Co. showed their Casey Jones, voice-controlled car. It was a mecca for the kids who were permitted to operate it. It was a toy electric car which could be made to start, stop, or to back up by telephone. Many grown-ups believed there was some trick of outside control, like the dancing mannikins which appear perennially with the Christmas street fakers. It was, however, an instructive demonstration of the accomplishments of the photoelectric cell.

"Another weird attraction demonstrated the accomplishments of accuracy, staged by S. K. F. Ball Company. They showed a hollow, bright plated sphere simulating a big ball and with an opening in the top. Around this were ranged seven discs suitably inclined. A lot of balls were dropped in spaced succession in the first of the seven discs and rebounded. With each rebound each ball traveled to the next disc and having reached the seventh, bounded into the sphere and was carried by some undisclosed conveyor system to the overhead discharge and in due course, released to perform its cycle of advancing rebounds.

"There was one feature that the State Police staged and I wish a similar display might be 'put on' by the authorities wherever the multitudes gather. It was a large horizontal relief map showing every conceivable hazard to be encountered by automobile drivers. Toy automobiles, trains, pedestrians, and so on impressively portrayed the evil results of poor judgment, recklessness, and unintelligence. In addition there were samples of the results both of poor driving and vandalism by drivers.

"Again, we had historical displays. In one corner was a woman — apparently one of the 'poor white hill billies' — working a 200-year-old hand loom and an old spinning wheel of unknown vintage. The adeptness with which she wove indicated familiarity with the work. I started to say that she *ran* the loom but that loom could not run — it could only plod. The variety of patterns produced was surprising, as was the skill with which the operator spun her yarns. She was a character out of a story book — slight of frame, thin, wrinkled face with keen, deep-set eyes, showing somewhat the ravages of time and hard work, but with an agility that some of our soft flappers would envy.

"For ourselves, we had a Model X Draper loom equipped with our K. A. electrical Warp Stop. I really 'hankered' to hang a sign on it: 'The Perfect Loom perfected by the Perfect Warp Stop.' We have specialized on electrical warp stop motions for 30 years. The weaving trade admits its excellence. Our K. A. is, I am sure, used on a preponderance of worsted and pile fabric looms, while among cotton, silk, rayon, and woolen customers are numbered some of the best-known mills of the country. From being contemned as a 'little machine shop on the Blackstone River with no experience in weaving machinery' we have grown into a concern, albeit small, that is well recognized."

Linfield Damon mentions his wonderful trip to the South Seas. The Secretary admits this to be his lifelong ambition, so far, unfulfilled.

Will Lawrence is back at M. I. T., on the job again, after a summer holiday at North Conway, N. H.

George Hooper sends another of his very interesting letters, of which the following is only one item: "Our trip to Arrowhead Lake was very interesting, especially the ascent from San Bernardino, the road rising about a mile in a 21-mile drive with magnificent views at every turn. It is a high gear paved road with ample width for two lines of traffic and numerous parking places from which the views can be enjoyed. My wife, who has twice been to the Tyrol, says that there is no finer scenery there."

Arthur Alley mentions a visit from George Hooper: "I have been away nearly all summer at my camp at Del Mar, about 30 miles north of here. The camp is situated right on the beach, a beautiful one, splendid bathing. A fine hotel is only a short distance away and when we were too lazy to get our own dinner, we went to the hotel, which was a great convenience. Some one called me up from this same hotel this fall and, after a little joking, I was told that it was George Hooper on the 'phone. It was a great pleasure to see him. His wife was with him and my sister and I took them for a long motor trip through our back country, gave them a good dinner, and we had a splendid time together all day. I was very glad that he got in touch with me. We had an old-fashioned 'gab fest,' talked you and all the boys over, and we hope to get together again. He is a loafer like myself at present.

"Everything out here is going on as usual, except, of course, we all feel the depression. Even the lemon growers are very poor. The returns from the orchards are not good. I think that the tide has turned and I am feeling more optimistic."

Charlie Hannington has had some unusual experiences, as already noted in previous Reviews, and his letters are always most interesting: "A month or so ago I went to Alma to look at a so-called gold mine. Left Denver in early morning, crossed the Continental Divide at about 12,000 feet to Pacific slope, then back over a 11,000-foot pass to Alma. Next morning drove the 'flivver' to about 12,000 feet and then, old and lame as I am, I climbed to 13,300 feet, found no mine, only a lot of old workings filled with the most beautiful ice crystals I

1891 Continued

ever saw. I was on a ridge where a misstep would hurl you down 2,000 feet into a black lake.

"The Museum fossil work was very productive this last summer. Six or seven small three-toed horses, seven small camels, and half a dozen rhinos.

"This has been like a summer's day. The sunset was glorious. I stood on Museum steps as the sun went down in a small bank of golden clouds and the sharp clear outline of the mountains from Longs to Pikes Peak, no such view anywhere, about 200 miles of sharp outlined mountains." [Secretary's Note: Whoever heard of a three-toed horse and how did the camels and rhinos get out there?]

Charlie Aiken is back in Lorain, Ohio, after his summer at Franklin, N. H. On his way back he stopped at Cheshire, Conn., to see his stepson, Dan, who is at the Roxbury School. He missed seeing Will Bassett who lives at Cheshire.

Morrill Ryder says he has had a rather hard time of it since the Reunion, but is now in good shape again. His mother passed on recently, a few days before her 90th birthday. His youngest boy was married on November 12 to a Middleboro girl.

Eli Bird writes of Morris Knowles' death: "With his many honors left behind, and to us, '91 companions, the memory of a big hearted comrade. . . . I look over our class books often; to review them is a joy, and so the days come and go, and we try to keep young and optimistic."

Charlie Wetherbee writes of a visit to Barney and his experience was similar to that of many of us who go to see Barney "to cheer him up," when Charlie says, "In fact, he cheered us up."

Fred Wilson writes of his many business connections that keep him busy, but like many of the rest of us, doesn't think much of present-day accomplishments. In commenting on his own personal feelings, most of us will agree with him that we believe things will work out sooner or later but still have fears or worries. The last sentence of his letter seems well worth repeating: "Fear is a terrible thing and a terrible influence; and, as the old saying goes, most of the things we fear never happen."

A most interesting letter from Charlie Garrison tells of his home at Long Beach, right on the ocean, of the beautiful country and rides. He admits they have sand storms once in a while but Charlie never loses his sense of humor. "We recently had a windstorm which lasted about 36 hours, one of those that bring the sand 100 miles from the desert. Very dry and disagreeable and a parching heat. In some localities all the oranges were blown off the trees. Fortunately, it was the end of the Valencia crop. The navels won't be ready until January so we won't have as much orange juice as usual. We will go heavy on nuts. We blanch peanuts and almonds — boil them in oil and salt them. Then I crack lots of walnuts. In fact, I think of calling our apartment 'The Nut Cracker Suite.' (This will be better understood by those musically inclined.)

"A few weeks ago the whole family (6) went to Hemet and across the 40-mile mountain drive to Banning. This is through the San Bernardino National Forest. We passed through Idlewild (where we went some time ago) and lunched by a mountain brook under the peak of San Jacinto (10,800 feet). It was like N. E. except that the trees were much larger. The road hung on the mountain side and we had fine views to the S. E. of range upon range of mountains as we came to open places between two peaks. Banning and Beaumont are great almond places and we bought some at the roadside. You may remember that I spoke last year of seeing the blossoms there in the spring.

"To go back to the windstorm. The day after, we swept up plenty of fine sand in the apartment and I am sure that I recognized some from Shattuck's place in Indio. He said the storm blew the sand from under his concrete foundations, leaving them in the air! I called on him recently; he has been poorly but promised to be good so he could go to the desert again.

"Sunday we had one of our most interesting mountain drives. Mt. San Antonio (Old Baldy, refers to the mountain not to me) was our objective. We drove to Pomona, Ontario, Cucamonga, and approached the mountain through Tytle Canyon from the S. E. We passed Glen Ranch, a well-known resort and reached the summit of the road about 8,000 feet (the peak is 10,000). From this point we had a far extended view of the Mojave Desert to the north and east. We looked down on Cajon Pass (4,300 feet high) and could see the roadway over the top and the highway, straight as an arrow for 15 miles to Victorville. You can cut off your motor and coast the whole distance as we did on our return home last year. Far beyond was Barstown which we could not see with the naked eye. Beyond the desert valley you could see a mountain range in the light haze. We then came down in a southerly direction, passing the place where our gear case was hit by a rock last year. Lower down we picnicked by a rushing brook amid trees, again making us think of home."

Cohasset remains the Mecca of many '91 Pilgrims and always will so long as Barney stays there. Some of the more recent visitors are Homer and Mrs. Goodwin, Carleton and Mrs. Read (and granddaughter), Rowland and Mrs. Barnes, George and Mrs. Holmes, and not long ago Morris Knowles, and as Barney says, "We shall miss him and cherish his memory with affection." — HENRY A. FISK, *Secretary*, Grinnell Company, 260 West Exchange Street, Providence, R. I. BARNARD CAPEN, *Assistant Secretary*, The Early Convalescent Home, Cohasset, Mass.

1893

Albert Farwell Bemis and Mrs. Bemis were in England the past fall and on November 3 attended the re-opening of Lincoln Cathedral, toward the restoration of which he, in company with other Americans, was a liberal contributor. The following Associated Press dispatch of November 3 from Lincoln, England, appeared in the American press: "The Duke and Duchess of York attended Thanksgiving services today for the re-opening of Lincoln Cathedral, which has been restored over the past ten years at a cost of $426,000, a substantial part of which came from the United States. Albert Farwell Bemis, of Boston, who gave $65,500 toward preservation of the center tower, was among the 4,000 who attended the services. A total of about $164,000 was contributed by Americans whose forbears belonged to Lincolnshire. Many tributes were paid to American generosity and to the late Dean Fry, who made three trips to the United States in the interest of the cathedral. Lincoln Cathedral in many respects is unique among English cathedrals. The building possesses every architectural style known in the country, from Norman to the Renaissance work of Wren. The earliest parts were built by Bishop Remigus who came over with William the Conqueror. The Angel Choir is considered one of the finest specimens in the entire range of Gothic architecture, and the great east window is deemed the finest example of its kind in the kingdom."

James C. Boyd, who has made his home at Portland, Maine, for the last few years and has been active in civic affairs of that city, was chosen President of the Portland Club at the annual meeting on November 7.

William F. Hunt resigned recently from his position as General Foreman of the Middlesex Fells Division of the Metropolitan Park System. It is understood he resigned somewhat in advance of the age limit because of poor health and that after a period of rest he may again engage in private engineering and landscape work. He first became a foreman in May, 1913, and has served since, under four Executives. He has been a member of the Stoneham Board of Appeal since its formation in 1925, and during the last four years has been Secretary to the Board. He was also a member of the Stoneham Planning Board for a number of years. Before entering the Metropolitan Park Service, he was engaged in landscape surveying and architectural construction with Guy Lowell. He was resident engineer of the Norwood sewer project and was on the engineering staff that built the Melrose sewer system. Among the other projects on which he has been engaged was the large Piping Rock Club on Long Island. At present he is on the consulting staff for the South Side sewer construction in this town. His education was secured in the public schools of Weymouth, Tufts College, and M. I. T. In his 19 years at the Middlesex Fells Division he has made that park reservation one of the most attractive within Metropolitan Boston. Hunt resides at 30 Buffalo Road, Stoneham, Mass.

1893 Continued

Adolph Lomb died at his home, 635 St. Paul Street, Rochester, N. Y., on October 1. He was a special student in mechanical engineering for two years, after which he became associated with the Bausch & Lomb Optical Company of Rochester, with which company he was identified throughout his business life. He maintained his home at Rochester, although for some years his headquarters were at the New York office of his firm. Although rarely able to attend Class meetings, his interest in the Class and Technology was always keen, as evidenced by his generous responses to appeals for contributions for Institute purposes.

Charles G. Waitt, whose sojourn in Praha (formerly Prague), Czechoslovakia, was described in the November Review, returned to Europe in the fall after his summer in Boston and under date of October 10 he writes from Karlsbad as follows: "Am here for a few days. This place is beautiful this time of year. Weather is cool and sunny but with no frost yet. Wish you could be with me over a week-end. The eats and drinks are wonderful."

The following recent changes of addresses are reported: Professor Ervin Kenison, 62 Dwight Street, Brookline, Mass.; Charles W. Taintor, Charlotte Ranch, Roll, Ariz.; Arthur F. Woltersdorf, 520 North Michigan Ave., Chicago, Ill. — FREDERIC H. FAY, *Secretary*, 44 School Street, Boston, Mass. GEORGE B. GLIDDEN, *Assistant Secretary*, P. O. Box 1604, Boston, Mass.

1895

The year 1933 is upon us. Let each of us face the interesting yet complex problems at hand with the same fortitude as in the past, for '95 will surely help to solve some of these problems.

Gerard Swope, President of the General Electric Company at Schenectady, N. Y., was presented with the Manufacturers' Medal for 1932, an award founded by James H. McGraw and given in recognition of conspicuous service, at the annual dinner of the National Electrical Manufacturers Association, held on the night of September 26. The medal was awarded to Swope in recognition of his work in behalf of the stabilization of industry. "Earl Whitehorn, Assistant Vice President of the McGraw Hill Publishing Company" says the New York *Herald-Tribune* of September 27, "in making the presentation, praised the Swope plan for recognizing that economic security for the worker must be the price of further industrial progress." Swope was also praised for his courage in recommending the system of unemployment insurance at such a time.

On May 12 Gerry was presented with the gold medal of the National Academy of Social Sciences, at New York City, in recognition of his constructive services, including his plan for dealing with stabilization of employment and other work along that line, and also for his work at Greenwich House, the well-known social center. He was the commencement speaker at the 1932 Commencement at Bryn Mawr College, and on June 7 was awarded the degree of Sc.D. by Washington University, at St. Louis, his native city.

Again we have an interesting note from the Bourne travelers. Each year Frank and Mrs. Bourne devote a great part of their summer to research and travel, and this past summer the scene was laid in Ireland. Frank writes: "You said that '95 would be interested in Ireland. Well, if so, it was more than I was last June when I changed my reservation for taking the car from Boston to Liverpool, and signed up to have it taken off at Galway. My plan was to drive across Ireland to Dublin and sail from there in three or four days for Liverpool, to spend the time in England. That plan was very effectively spoiled because we dropped into a fascinating old castle near Fermoy. Three days drifted on to three weeks and it was finally over a month before we left Cork for Fishguard.

"In the meantime we made our castle in Ireland our headquarters for the month, going from there north, south, east, and west, 3,200 miles in all; from Blarney, with many other trippers, to Giant's Causeway, where there were also tourists, to Kilkenny and Killarney, to D'ngle and Dargle, where there were no 'trippers.'

"We hunted for Irish Crosses dating from the time when Christian Ireland was sending missionaries to the barbaric north of England; round towers, whose purpose is not yet explained, beehive huts 600 B.C., tumuli 2000 B.C., fairy circles, witches beds, and Ogham stones. We sketched and photographed whitewashed cottages with picturesque thatched roofs and little flower gardens in front. Neatness was everywhere, neat cottages, neat houses, well-kept roads and roadsides, hedges clipped; you wonder how the descendants of such neat people can stand for such a mess as they make in our free country.

"Their system for marking high roads is that of the Automobile Association, clearly lettered, and the only signs in sight, a fine and neat system. There are absolutely no signs in the little country roads, so you can get delightfully lost in no time. The roadside walls are covered with green, with fuchsia hedges in bloom, or honeysuckle. The hens have not quite learned to keep off the road. Pigs are the cleanest you ever saw, and the sheep are pure white, and not powdered different colors as they are in England.

"You can't find Waterford glass in Waterford, nor a shillelagh in Shillelagh, where you have to put up with blackthorn. You don't want to go to Tipperary, apparently they have no limericks in the city of that name. John McCormack sings of The Rose of Trailee, but that town is quite up to date, with bar rooms, and commercial hotels that are well kept, stores selling fruit, groceries, or goods from all over the world. The Rose probably works in one of the stores.

"We talked to hounds that seemed almost human in their intelligence, as they came out of the pack in answer to their names. The Dublin Horse Show was again the neatest place imaginable, with antique laces and modern weavings in a special pavilion. From crowded grand stands where you were not overcrowded, we saw pink coats, a pack of hounds, and the best jumping in the world. We lost our hearts to the Abbey Players and saw every play we could. You can see them here for a company came back on our steamer and are touring the United States this winter."

Henry D. Jackson, of Newton Center, Mass., our Class Representative on the Alumni Council has moved to 29 Noyes Street, Concord, N. H. Francis C. Green, formerly from Illinois, has been located in Wyncote, Pa., at 835 Glenside Avenue. — LUTHER K. YODER '95, *Secretary*, Chandler Machine Company, Ayer, Mass. JOHN H. GARDINER, *Assistant Secretary*, Graybar Electric Company, 420 Lexington Avenue, New York, N. Y.

1896

As the result of the retirement of Dr. W. R. Whitney '90 from the active directorship of the General Electric Research Laboratory, Dr. Coolidge, who has been Senior Associate Director of the Laboratory, becomes Dr. Whitney's successor in full charge. Dr. Whitney remains as Vice-President in charge of research.

Dave Beaman, who is Vice-President of the New Bedford Gas and Edison Light Company and active Manager, has been having his troubles with a threatened strike of gas consumers, who claim that the Company is charging too high rates and making enormous profits. Dave only had to show his books to the investigating commission to prove that during the last year the Company had earned less than five per cent on the book value of the property, in spite of cuts in salary, which in the case of Dave's own income had meant eight and a half per cent.

Will Hedge, as President of the Boston Insurance Company, of which incidentally his twin brother Henry is Vice-President, has submitted the annual report of the Company, showing an extremely strong position reflecting the able management of the Hedge boys. The total invested assets of the Company amount to $18,599,087 and more than 30% of this is in United States Government bonds and United States city, county, municipal bonds and cash.

Rear Admiral Charlie Morris and Mrs. Morris announce the engagement of their daughter, Miss Barbara Morris, to Thomas DeNyse Flynn, son of Lieutenant Colonel Thomas Flynn, U. S. Army. Mr. Flynn is now a member of the graduating class at West Point and the wedding will take place at West Point in June.

Harold S. Boardman, President of the University of Maine, has acquired the job of Chairman of the Committee of nine members to study the effect of the depression on the land grant colleges and

1896 Continued

universities and his program has included a questionnaire which he sent out to the 51 institutions involved. The information thus obtained is to be considered at a meeting called by Boardman in Washington, D. C.

Arthur Baldwin, writing from Paris, has replied to the Secretary's gentle chiding that it sounded suspicious for a man to be in Switzerland, the playground of Europe, on business. Nevertheless, Arthur states that such was the case. His job for the International General Electric Company in Paris calls for considerable traveling around Europe, although, as a matter of fact, he insists that he has never had the opportunity to really tour Europe and see objects of interest. One interesting bit of his report had to do with his little farm or, as he styles it, his week-end refuge near Orléans, which he states is a lovely spot in a region that is known as the Garden of France. Everything grows to perfection and he ranges from hybrid tea roses to golden bantam sweet corn. Incidentally he has turned to his classmates for advice and reports that he has received free consultant service from Professor Charles Gilman Hyde on the subject of septic tanks. If Arthur had this place in California, he would call it a ranch. The interesting end of Arthur's letter was the announcement that he expected to make a hurried trip to America during December, so that by the time these notes appear in print he may have actually been in Cambridge and have seen some of us.

At the time these notes are written, the last of November, Jacobs reports from the University at Burlington, Vt., that he is already snowbound, but gives warning that he plans to descend upon Boston during Christmas week for his annual spree and attend the meetings of the Geological Society. Just now he is having a lot of fun playing with his seismograph and is catching earthquakes from all over the world. It must be more interesting than tuning in China on the radio. Jacobs reports that Moat is holding up to his usual lusty condition but that Dickinson, who is in the Electrical Department at the University of Vermont, had not been enjoying the best of health for some months back, although he now seems to be on the mend.

The Secretary wishes to acknowledge the many notes of condolence received as a result of his birthday accident in August. He is happy to report that the broken arm is progressing very satisfactorily back toward normal.

Mark Allen sent his wife and daughter on a tour through New England during the fall and directed them to make contact with his friends in Boston and Cambridge, including the secretaries, but apparently Mark's authority cuts little figure in his family, as nothing was seen or heard of the ladies.

Charlie Lawrence favored the Secretary with one of his attractive letters, although unfortunately it contained very little in the way of general news. Apparently Charlie is still holding up to his usual form in Brooklyn.

Willett A. Wood, VI, who has been for many years associated with his father in the publishing business in Detroit, unfortunately suffered a stroke last January which affected his right side and also his speech. This has incapacitated him for all work, although he maintains a live interest in general and Technology affairs in particular. It is understood that he has been showing slow but gradual improvement in health.

We left the Fullers at Stanley Pool and we now go on: "Today finds us in the heart of Central Africa at the head of navigation on the Middle Congo river and almost midway of our journey across Africa along the equator. Although only 1,000 miles from Stanley Pool, where we took passage on a comfortable river steamer, or approximately the distance from New York to Chicago, it took us 15 days for the trip, as compared to 18 hours between the cities mentioned. The steamer is operated by the manufacturers of a soap familiar throughout America, and its main object is to bring the yellow oil made from the nuts to the coast, from which most of it goes to the United States.

"Aside from three Portuguese and two Swedish missionaries, one of whom, Reverend P. A. Westland, once visited the Swedish church at Brockton, we were the only passengers. The food consisted mainly of local products such as native goat, wild pigs, scrawny chickens, tiny eggs, and an occasional duck. Crocodile eggs, about the size of those of a goose, but with granular whites and practically no yolks, were served as a novelty. 'Palm-oil chop,' similar to chicken curry, with yellow oil taking the place of curry powder, was really good. Natives along the river eat the juicy palm worms, three inches long and half an inch thick, as well as ants, as luxuries. We passed up the former and only ate the latter as they inadvertently got into our regular food.

"The feeding of the passengers is a private venture of the captains who, at $2.50 per day per person, sometimes make quite an income on the side. Although fine cabins, good berths, and mosquito-bars go with the tickets, we were surprised to find neither bedding nor towels were supplied, and had to purchase outfits at the first stopping place.

"The long passage up the river was due to the fact that the steamer tied up each night because of the difficulties of navigation and the necessity of sleep on the part of the captain and engineer, the only competent operating officers. Since the wood for fuel was taken aboard during the night stops, the time was not entirely wasted.

"For the first two days we ran between high grassy hills, then the land became low, flat, and covered with dense jungle, through which we continued day after day for nearly two weeks. The river is from four to 12 miles wide and is filled with islands amongst which we wound our way, sometimes in channels so narrow we could almost touch the trees and sometimes in lake-like expanses dotted with islets. There are over 4,000 islands in all, some 50 being over ten miles in length.

"Native villages occur every few miles, with an occasional European trading station or mission. The inhabitants become less and less civilized as the river is ascended, and the clothing more scanty. Dwellings are entirely of wattle and mud walls and thatched roofs and commonly accommodate a single family, but one 'long house' with over 40 rooms was seen. Log or hide drums were frequently heard as the steamer passed. Boys, like boys the world over, swam out by dozens or paddled out in dugout canoes to get tossed in the wake of the steamer or to beg for a much prized empty bottle.

"Of tropical life we saw an occasional crocodile, parrots flying in pairs, and a few pelicans, but of the hippopotami we saw nothing, the river banks being too thickly inhabited. Sometimes we could see the boughs of the trees bend down and spring back as a band of monkeys passed along. The only snake seen was a seven-foot, slender, blue-black variety resembling our own blue-racer.

"Stanleyville, from which this is written, is quite a town, with palm-shaded macadam streets and many American automobiles. They seem to think starters are only for use in great emergencies, and it is annoying when one is in a hurry to wait for native boys to push the car to start it.

"It is interesting to realize that when an American housewife uses her soap to the last scrap instead of throwing it away and starting with a new bar, the effect is felt even in Central Africa, where the palm nuts are often unpicked and the oil unsold as a result of the curtailment, while the natives must go without necessities or luxuries which the money would buy. It certainly brings home the world-wide effects of the business depression.

"From Stanleyville, through which Stanley passed on his famous search for Livingstone, we visited Stanley Falls, which terminate the navigation of the Middle Congo. Around these we expect to pass tomorrow by train on another step on our way to Lakes Tanganyika and Victoria." — CHARLES E. LOCKE, *Secretary*, Room 8-109, M. I. T., Cambridge, Mass. JOHN A. ROCKWELL, *Assistant Secretary*, 24 Garden Street, Cambridge, Mass.

1897

In the October 15 issue of the Boston *Transcript*, John Clair Minot writes as follows: "In the history of college fraternity magazines there has never been a peak of achievement equalled to that attained by the Delta Kappa Epsilon *Quarterly*, oldest of the lot, in its golden jubilee issue this month. Its editor, Oswald C. Hering, an M. I. T. graduate, brings the number to three or four times its normal size, with a special cover in gold, and with many special articles and 170 illustrations." Mr. Hering, IV, will be remembered as a prominent member of our Class, and his classmates will rejoice in his success in this line of endeavor.

1897 Continued

Again our classmate, Oswald Hering, comes to the limelight. I think that all the members of the Class would be interested in reading the following clipping, taken from one of the New York papers, about his new book, "Down the World," and I feel confident that after reading these notes, every member of our Class will be glad to procure this book and read what Hering has to say. The newspaper reads as follows: "No season lacks its attractive travel books. Here is one as unconventional in manner and make-up as it is in format, and when its 'difference' has won your attention and lured you within the covers, you will find it one of the most delightful and stimulating travel books of many seasons. Mr. Hering, a graduate of M. I. T. and with a host of Boston friends, is not the type to do his globe-trotting or his making of books in any conventional manner. Though he is a well-known New York architect, he is probably known more widely as editor of the Delta Kappa Epsilon *Quarterly*, the oldest of Greek-letter fraternity magazines, and under his enterprising management by far the best known.

"Mr. Hering rambled around the world in his own time and in his own way, not in the now familiar vagabonding fashion and not tied to schedule on any tourist steamer or route. He journeyed in style when he felt like it, and roughed it if inclined that way. He begins his story on a Dutch liner off the Arabian shore, and almost before we know it we are sharing his ecstasies over the dream city of Udiapur, of which he heard for the first time at Bombay. It was the delay of another liner, after bumping a rock on the coast of China, that led to his acquaintance with an *attaché* of our embassy at Peking and thus opened the way to his visit to northern China just as all other foreigners were being expelled on account of civil war there. He allowed his trip to plan itself that way, and succeeded in visiting just the cities and parts of the world that you and I want to see, but probably never will.

"The book, you have gathered, is not a connected narrative of travel experiences and observations, but a collection of about 30 articles that range over all the continents and all the seven seas. They are written in the simple, unaffected language of culture and reveal on every page the spirit of a lover of the beautiful. Major Dugmore, well-known English writer of travel and adventure books, writes a foreword in which he dwells on Mr. Hering's happy way of noting and telling us about the beautiful things that he saw and the lovely things that happened to him, instead of stressing his hardships and the ugly and sordid things in the life of the strange lands visited.

"The architect came to the surface when old temples and tombs hove in sight, but even then Mr. Hering remembers he is writing for laymen rather than for the fellow-members of his profession. And the humor is always on the surface — for example, when he used the gambling urge as a cure for the seasickness of a sweet thing among his fellow passengers on one occasion, when he spent six of his 12 days in Oahu in recovering from sunburn, and when he tried to get his money's worth for spending $40 a day in crossing our own country. After reading of exciting and enchanting adventures in Java (which is described as our Vermont transported to the tropics), in Germany, in the Philippines, in Bali, in Ceylon, in the Argentine, in Peru, and a dozen other lands and islands, you come suddenly upon a particularly delightful chapter upon the old plantation homes of the lower Mississippi Valley. There are more than 100 illustrations reproduced from photographs taken by Mr. Hering in the rôle of camera artist — just one more rôle that he fills supremely well."

The Class of '97 held its Thirty-Fifth Reunion at Boxwood Manor in Old Lyme, Conn., on June 10, 11, and 12, 25 men and several of their sons participating.

A considerable delegation started from the Engineers Club, Boston, Friday noon, June 10, in automobiles, reaching hospitable Boxwood in ample time for dinner, when they were joined by the men from other places. We were favored by perfect weather, and the beautiful gardens at Boxwood were at their best.

C. W. Bradlee, Percy Blood, Jere Daniels, Charles Eames, Arthur Hopkins, John Hastings Howland, Jack Ilsley, Frank Preston, H. W. Estabrook, Frank Mansfield, Charles Currier, Archie Clark, George McCarthy, Jimmie Baker, Louis Buff, William Binley, Ben Howes, F. L. Edmunds, A. P. Norris, John Taylor, Joe and Wilfred Bancroft, Tom Atwood, Chester Hubbard, and Harry Worcester constituted the depression-proof crowd.

Friday evening was given up to bridge. Some of the psychic bidding displayed would have made Culbertson blush, but everyone had a good time. Saturday was devoted to golf. Under the handicap system used, Mansfield and Hubbard were returned the winners though each contestant was sure a fair handicap would have resulted in a victory for himself. Bradlee and Worcester had a heavyweight contest of their own, and as Charlie was seen paying Harry $1.65, it is supposed the latter had the better of the argument. Saturday evening we had our big dinner and Class meeting, after which Jere Daniels told us some of his experiences in Spain and John Taylor gave us a very interesting account of experiments with the transmission of speech over a light ray from the dirigible *Akron*. Sunday saw the crowd breaking up and the last motored off shortly after lunch. — Estabrook has furnished some very interesting pictures of the crowd which will be forwarded to those present at an early date. — JOHN A. COLLINS, JR., *Secretary*, 20 Quincy Street, Lawrence, Mass. CHARLES W. BRADLEE, *Acting Secretary*, 261 Franklin Street, Boston, Mass.

1901

In a recent letter I noted that Ned Beckwith had been on the cosmic ray expedition to Alaska and a member of the ill-fated party of five, two of whom lost their lives during the period spent on the mountain. Within the last few days Ned has been in Boston and I have had the pleasure of seeing him and hearing more about his adventures. Ned is a well-known mountaineer, a member of the American Alpine Club — this latter a distinction coveted by the many and attained by the few — the requirements of which are very rigorous and based solely upon an extended record of accomplishment. He had opportunities to participate not only in the Mt. McKinley expedition which he accepted, but also in the Himalayan attempt made last summer. As it is to be hoped that he will collect the record of his experiences in some permanent form, I shall not go into the very interesting details which he gave me of his experiences. It may be mentioned that the party flew from Fort Fairbanks to the glacier from which the ascent was made, this latter possibly a unique record of a mountain landing. The return trip of the plane was an even more strenuous experience as at that altitude they had to get a land speed of 70 miles an hour in order to get a take-off, and this over ridges of freshly fallen, frozen snow. A minimum thermometer recovered by them, left behind by the Parker expedition, recorded a temperature of 95° below zero. As this was the recording limit of the instrument, it is a maximum and the actual temperatures may have been even lower. But we must wait until Ned's own account appears, as I hope it will. He hopes to be present at the 32nd Class Reunion next summer and put in a few perilous days on the Cod Cape Alps. His companions in this enterprise should provide an added hazard.

All of which leads me to the consideration of another matter; namely, personal news of members of the Class. Recently I have seen one or two Class records compiled by our predecessors at the end of 25 to 35 years. I am impressed by the foresight and prophetic spirit of the older generation in apparently stating their records *en gros* et en detail from the hour of birth in anticipation of the happy day 50 years after (or thereabouts) when a Class Secretary should clamor for the reportable details of a preceding five decades. Equally does the objectivity of these autobiographical reports fill me with awe and admiration. To a man, they stand on the exalted eminence of their successful later years and relate without a trace of morbid modesty the superiorities of five decades that, in the words of the Broadway thriller, "have made them what they are today." Industry, thrift, perseverance, integrity, and a score of other admirable human qualities are frankly at a discount because of the unvarying frequency of report.

Now in all honesty, I should despair of editing a compilation of similar data drawn from the reluctant lips of the members of our Class. The Herculean effort to draw even a meager sentence from my inferiority complex beset classmates can be appreciated only by those who have had a like experience. Ned Beckwith is a

1901 Continued

case in point. His report to me on a summer of wild adventuring was "On the Mt. McKinley cosmic ray expedition" and I know he has mourned in secret ever since over the graceful but unnecessary "the."

So I do not contemplate appealing to you for the smug minutiæ of why you are so good. That would be hopeless, and in some measure thankless, for we both acknowledge that you are. No, rather let me delve into the rose-illumined corners of your sin-stained past, learn from your lips the tales that, moist and incarnadined, never could pass the domestic board of censorship, the stories of your failures, your shortcomings, the lurid acts committed under the ægis of anonymity and a copper riveted alibi. These would make real reading for all — except yourselves — and would win for you an enduring fame, an undying memory. Who of our literate would not pause to read how ..... got the contract from ....., the poignant story of the love lives of the Class Casanova ....., or why ..... left home? Good meaty reading, that, and in the modern idiom. Think it over and if you feel inclined to contribute toward this worthy enterprise, remember that the slogan is, as it has been, "interesting news about yourself or some other member of the Class." Note the stinger in the tale and overcome your Freudian inhibitions. I am receiving sealed bids for the publication rights already and plan to devote a portion of the proceeds to some worthy cause such as an archæological expedition to exhume the remains of experimental physical science — this really falls into the medico-legal field — or a commission to study the Riemann potentialities of so-called social service.

All of which leads me to promulgate the glad tidings that we are to have a 32nd Reunion next spring. Plan to come and don't bring the little ones. — ALLAN WINTER ROWE, *Secretary*, 4 Newbury Street, Boston, Mass.

1902

Our Class President, Les Millar, has opened an office at 205 East 42nd Street, New York City, as Eastern Sales Representative of the Lehnco Regulator Company and the W. H. Fletcher Company. His office is Suite 1810 and his telephone is Mohawk 4-6290.

Miss Priscilla Place (better known as Perry Place), elder daughter of our former President, Clyde Place, was married on September 24 to Mr. E. Carlton Nickerson, 2nd, at the summer home of her parents at Chatham. Mr. Nickerson is the son of Mr. and Mrs. Oscar C. Nickerson of Chatham, and graduated from Harvard last June. As mentioned in the last number of The Review, Miss Place graduated from Wellesley last June. Her engagement was announced at Commencement time. The young couple are making their home in Cambridge.

Elisha Walker becomes a partner in the well-known New York banking firm of Kuhn, Loeb and Company on January 1. Walker, who was a graduate of Yale before coming to Technology, started in the banking business with William Salomon and Company of New York soon after graduation. In 1909 he became a partner in this firm and when the Salomon firm was merged with Blair and Company, Inc., in 1920, Walker became President and Chairman of the Board. In 1929 Blair and Company became part of the Bancamerica-Blair Corporation, which was merged in the Transamerica Corporation of which Walker was the head until his recent retirement.

Jack Fruit is associated with the Equitable Life on special group policy work. Jack has had experience in the life insurance game, having been for some years with the Chicago Office of the New York Life Insurance Company before coming to New York. — Dana Fisher has left Philadelphia and his address is now 824 Ash Street, Winnetka, Ill. — FREDERICK H. HUNTER, *Secretary*, Box 11, West Roxbury, Mass. BURTON G. PHILBRICK, *Assistant Secretary*, 246 Stuart Street, Boston, Mass.

1905

Herb Wilcox, Vice-President of Electrical Research Products, Inc., subsidiary of Western Electric Company, read a paper before the Franklin Institute, Philadelphia, on the Development and Use of Talking Motion Pictures. He traced the development of the art, giving credit to the Bell Telephone Laboratories, of which Harry Charlesworth is now the directing head, for the perfecting of the DeForest three-element audion.

By 1925 most of the elements for a successful talking picture system were in existence and in 1926 began the commercial development by Warner Brothers. It must have been soon after this that Wilcox took your Secretary on a round of all the talkie theaters in New York. There were four. The visit to the projection room was most interesting as the sound was then recorded on disks and the change from one disk to the next apparently required considerable skill.

The paper describes the two methods of photographic or film recording known as the variable area type and the variable density type, the maintaining of the uniform recording level and the development of the instruments used in correcting the acoustics in theaters.

From Henry Keith, XIII: "Like everybody else, we have been hit by the depression, and our activities have been correspondingly reduced. Shipbuilding is especially quiet, and launchings are few and far between. I received this morning, however, an invitation from the Federal Yard at Kearny, N. J., for the launching of the Grace liner *Santa Elena*, November 30, but otherwise, these events are scarce. In warship work, we are now reduced to destroyers and I expect that the next step downward will be row-boats and canoes armed with bows and arrows.

"I see Cowdrey quite often in the Testing Lab. but have not seen Doc Lewis or Lyon for some time. Cowdrey is always busy making tests or overhauling gears, and tells me to give you his best regards.

"In our own department, we have a large class (34) of Naval Constructors this year and have gone back to the three-year course which was given them some years ago. In other words, these men now come here direct, instead of going to the Post Graduate School at Annapolis."

In Bermuda last July, your Secretary attempted to locate Edgar Meyer in St. George's. His father, who conducts a variegated business including coal, oil, and water supply for ships, wrecking (like Bob Gardner) and ship scrapping (like Henry Ford), has a lovely residence on the bluff overlooking St. George's harbor. From here, an eye can be kept on the rum runners at anchor in their home port. The boats, about 50 feet long and speedy, run on a definite schedule, all the inhabitants knowing what days they depart and return. This business of late has not been good. Our classmate was in California.

Hub Kenway, II, has had great success with Gillette Razor patent cases, particularly in Connecticut courts. Several decisions have been made in his favor. Kenway says: "George Jones is Gillette Counsel in the Middle West and has done some great work in Chicago on trade mark cases. He is now representing Kenway & Witter in a case against Stewart Warner in Chicago. George has his son, Bayard, now in his office. I had him over a night in Beverly in September and gave him a look at salt water.

"Grove Marcy has 600-odd barrels of apples on his hands and a tough business condition to buck. He has taken to golf, much to my disgust, for I'd hoped to keep on playing tennis with him till we were 75 at least. I'm still on the court myself and enjoyed the season more than ever."

From John Damon, VI: "I don't know that I have advised you before but I have a lively ten months' old son and this being my first child, it might be considered as a Class event although the sons of some of the members of the Class are having their own children. I will have to work for quality, not quantity, now."

From Sid Strickland, IV: "I had such a pleasant evening October the 18th with two classmates, that I thought it was worth a note to you for the News.

"I received a friendly notice from the Unitarian Layman's League of Roxbury to a supper at 6:30 to hear Professor Cowdrey of M. I. T. His subject was "Pictures Along the New England Coast." Let me say before I go any further that old as I am, I was in for two revelations — the first was Andy Fisher officiating as the chef behind a huge dish of quahog chowder, and acting furthermore in an official capacity as Secretary of the Layman's League.

"Secondly, the revelation of Cowdrey as an after-dinner speaker, taking a subject so familiar to me, the New England coast, and presenting it through new eyes and in a most picturesque manner. When I have thought of Cowdrey, in my mind, huge testing machines have always come to the fore — and stresses and strains — so to hear him talk entertainingly for an

1905 Continued

evening without mentioning that picture made a tremendous impression upon me.

"Cowdrey, throughout the time of his vacations, has applied time to excellent advantage in migrating, season by season, from the south shore of Cape Cod north as far as Mt. Desert Island in Maine. In each locality he has become exceedingly familiar with the details and character of the neighborhood, and he has also appreciated the picturesque qualities and the beauty throughout the whole distance. The lantern slides were made from his own pictures and colored by hand, and I hope that his classmates will, at a not too distant date, have the privilege of seeing his pictures and hearing his story. I expected Andy to agree with me that the chowder would be good, but when he became enthusiastic over the pictures of the evening it only goes to show how good they were." — ROSWELL DAVIS, *Secretary*, Wes Station, Middletown, Conn. SIDNEY T. STRICKLAND, *Assistant Secretary*, 20 Newbury St., Boston, Mass.

1907

We wish that every classmate might follow the example of Edwin W. James, who has sent us a very complete outline of his activities and experiences since 1907. Last spring, in connection with publicity for our Twenty-Fifth Anniversary, we sent out statistics sheets to 248 members of the Class. Only 106 have been returned. This is the smallest percentage of replies we have ever received, during the past 25 years, to requests for an account of what 1907 men are doing in the world. In most cases we know that failure to complete and return these sheets is merely thoughtlessness or the feeling that "similar information was given in 1927, nothing of interest has happened since then anyhow, and what is the use of all this red tape." If you who have not sent back your sheets could be Class Secretary for a year or two, you would realize that the only way in which he can keep Class records correct, and furnish information for The Review and to various classmates, who from time to time write in asking what "so-and-so" is doing now, is by occasional up-to-date reports from headquarters, and that headquarters for each member of the Class is that member himself. So you who read this and who haven't sent in your statistics sheet, "take your pen in hand" and do so now. Mail it to the Secretary, and if you have mislaid the blank form, write the Secretary and he will send you another one.

Now returning to classmate James, he writes that after graduation he was assistant engineer and district engineer at Manila, P. I., with the Bureau of Public Works until 1909, then after a brief employment with the Intra-Costal Canal Survey in Rhode Island, he became a highway engineer with the Bureau of Public Roads, U. S. Department of Agriculture. He has served with this same Bureau ever since, successively as senior highway engineer, chief of maintenance, assistant to the chief engineer, chief of division of design, and since 1930, as chief of the Division of Highway Transport. He was technical adviser, International Diplomatic Conference on Automobile Regulation at Paris, France, in 1926; consulting engineer, Republic of Colombia, S. A., 1929–1930; chairman of Technical Committee, Inter-American Highway Commission, 1929–1932. He received the Belgian award for Technical Publications at the Sixth International Road Congress in 1930. Many publications in magazines and official documents have appeared under his authorship, and he has prepared about 100 miscellaneous papers and addresses, dealing chiefly with highways and traffic problems. He is married, has one daughter 25 years old, and lives at 2919 43d Street, N. W., Washington, D. C.

James Reed, one of the naval constructors associated with our Class, is general manager with Schlage Lock Company, address P. O. Box 3215, Ferry, San Francisco, Calif. From 1907 to 1920 he was in the Construction Corps of the United States Navy, during that time serving as shop superintendent at Philadelphia Navy Yard; on special duty in South America in 1911 and in Mexico in 1914; as New York Superintendent at Mare Island Navy Yard in California from 1914 to 1920, where he assisted in supervising the construction of the U. S. Destroyer *Ward* in record time, the ship being launched in 17 days from the laying of the keel, a record never before approached. From 1920 to 1922 he was assistant to the President of the Los Angeles Shipbuilding and Drydock Company, from 1922 to 1926 in consulting practice, and from 1925 to 1929, general works manager of the Celite Company in California. Reed is married and has a son 22 years old.

The Secretary has a slight change in address from 19 Rowe Street, Auburndale, to the one given below, in the same community. — BRYANT NICHOLS, *Secretary*, 12 Newland Street, Auburndale, Mass. HAROLD S. WONSON, *Assistant Secretary*, Commonwealth Shoe and Leather Company, Whitman, Mass.

1909

The New York crowd had a most enjoyable Class luncheon at the Technology Club on October 29, and plan to hold their next meeting on March 11, 1933. Paul Wiswall wants you all to reserve that date, not only those of you living near New York, but any others of the Class who can plan to be present at that time. These luncheons have been held more or less regularly for the past nine years. The regulars always come, with now and then a new face.

It would be a fine thing if '09 groups in other cities would follow the lead of the New York brethren. We used to have Class luncheons in Boston occasionally but for some reason we have been slipping lately.

Someone in the New York crowd is getting statistical and wants to know if we have a grandfather in the Class. Who knows? I don't. George Haynes believes his daughter, Muriel (about whom we wrote last month), to be the Class baby.

Gene Connolly is located at East Walpole, Mass., where he is employed in the Purchasing Department of Bird and Son. Gene says that Al Comins came out to examine their custom-made shingles and gave him a good order. Comins is building a camp in Maine.

Writing to Paul Wiswall the other day, Delos G. Haynes, who is a patent attorney in St. Louis, says: "In Mexico City a week or so ago I spent an evening with our classmate Salvador Altamirano and his delightful family. — I see Phil Chase every few weeks. He is Chief Engineer of the Philadelphia Electric Company, Philadelphia. — I also see Harvey Pardee every few weeks. He is in Chicago. — I am in New York about once a month on business and will make every effort to attend the next luncheon."

Max Weill is Vice-President of the Board of Industrial Counselors, Inc., with offices at 21 East 40th Street, New York, engaged in making surveys and giving counsel to manufacturing organizations.

Harry Whitaker has been loaned to the Government to help out on Reconstruction Finance Corporation and expects to be in Washington, D. C., for several months. — CHARLES R. MAIN, *Secretary*, 201 Devonshire Street, Boston, Mass. PAUL M. WISWALL, *Assistant Secretary*, General Foods Corporation, 250 Park Avenue, New York, N. Y. MAURICE R. SCHARFF, *Assistant Secretary*, 1 Wall Street, New York, N. Y.

1910

The *Herald* the other day carried a picture of the Vice-President of General Foods Company, in charge of research, Lewis Waters. Lewis spoke before the advertising men at the Hotel Statler, and let's hope he gave them food for thought.

The following excerpts from a letter from Hopkins were passed along to your Secretary: "Hopkins went to China in 1914 and was with the Standard Oil Company in various capacities there, in 1929 ultimately reaching the position of General Manager. During this period he was off for the year 1918 in the U. S. Army Corps of Engineers for war service, although actually he never got out of the United States. In 1930 he resigned from the Standard Oil Company to accept the Presidency of the Shanghai Power Company, which is owned by the American Foreign Power Company, and supervised by the Electric Bond and Share Company. He reports that it has been extremely interesting to watch developments, although long ago he ceased to even attempt to make any forecast of what would happen in China. The recent development of Shanghai, for example, has been phenomenal during the period of strife. New industries and expansion of plants have multiplied at a very rapid pace, stimulated by insecurity in the interior of China, depreciated silver, materially increased import duties and steadily rising standard of living. Almost immediately after the Japanese bombardment the load on their power system was 12% over that of last year.

1910 Continued

"Hopkins reports that he was married in 1918 and has two boys aged 10 and 8, whom he hopes may sometime be enrolled at M. I. T. Hopkins is also President this year of the Shanghai Technology Club, and this Club sets a splendid example of activity for other clubs and is the most active of all alumni clubs in Shanghai. Attendance at monthly meetings averages around 45. One or more members act as hosts for the evening and all wine and dine on each other. Occasionally they have a speaker or visit plants of special interest, go swimming or journey to nearby places. Food, drink, and no formality are the keynote. Actually they have seen little of the depression in Shanghai. In fact, they have been having a quiet period of prosperity, due to the great concentration of interior wealth within this protected area around Shanghai."

Phil Laurson writes: "I am glad to contribute a few lines of unimportant information to the Class news. My job of Associate Professor of Engineering Mechanics in the Yale School of Engineering is a pleasant one in many respects. It has afforded leisure for one trip to Europe and other lesser excursions in our own land.

"In recent years a considerable part of my so-called spare time has gone into the joint authorship (with colleagues of mine) of two books. One, a textbook, 'Properties and Mechanics of Materials,' has been adopted by a gratifying number of engineering schools. The second book is coming out this month. Historical in nature, it bears the title 'The Early Years of Modern Civil Engineering.'

"I see three 1910 men once in a while: Floyd Pitcher, R. R. Taylor, and George Mylchreest. Pitcher was promoted recently to engineer of structures of the New Haven Railroad.

"One of my hobbies is painting. Though I have found little time for it, I have had landscapes in two of the annual exhibitions in New York sponsored by the American Society of Mechanical Engineers. Mrs. Laurson and I have recently become addicted to golf in a moderate way. Best wishes for a successful crop of Class news."—DUDLEY CLAPP, *Secretary*, 40 Water Street, East Cambridge, Mass.

1911

Your Secretary and Mrs. Denison went down to Lexington to vote and so on Election Eve, November 7, we had a Class dinner in Walker Memorial, and, believe it or not, we had 11 men, no more, no less, present, to wit: Ernest Batty, Obie Clark, Marsh Comstock, George Cumings, Dennie and Jack, Charlie McManus, Carl Richmond, Ted Van Tassel, Emmons Whitcomb, and Gordon Wilkes. After one of Bert Bridges's usual fine dinners we listened with interest to a talk on Institute affairs by Gordon Wilkes, one of 1911's two faculty members. Carl Richmond presented O. W. Stewart's regrets that an important Hyde Park Y. M. C. A. membership drive meeting prevented his attendance. O. W. has been devoting a lot of time for close on to a year to this fine work in his home town and has been largely instrumental in a gain in membership from 225 to 1,100. Ted Van Tassel, seldom absent from a Class dinner, drove up from Norwich, Conn., and he told us of an improved construction shoe he has perfected, bringing a sample pair along, which will soon be on the market. He also told of a new product, almost ready for marketing, leather non-skid auto chains, which have passed some phenomenal friction tests. In the usual bowling match afterwards, Wilkes's Warriors swept three strings cleanly from Clark's Climbers. Gordon showed us that he has kept his hand in well in bowling on the M. I. T alleys, having the high single string, 102, and the high total, 269. Clarkie had second high single, 90, and Cumings second high total, 258. Dennie and Whit shared the low single and low total with 39, and 146, b.i.o.n.!

Charlie Ashley's father, C. S. Ashley, New Bedford's perennial mayor with 28 terms to his credit, is a candidate for re-election this fall. — Phil Avery, IV, won honorable mention at the Sixth Annual Small House Exhibit of the *House Beautiful* magazine, held in Boston in late November in the class for houses costing less than $10,000, against the competition of architects from 25 states and Hawaii. — Suren Bogdasarian, IV, reports he is in a new enterprise, a statistical organization which analyzes the yearly reports of companies, charting the figures, and thereby securing a complete picture of affairs. Approximately 100 companies, whose stocks are listed in the big board in New York, are to be plotted and studied.

Stu Copeland, II, Vice-President of the Eastern Manufacturing Company at Bangor, Maine, has been made a member of the executive committee of the Maine Traffic Association. — We have tried hard to get a personal story from Hal Davis, I, Nashua, N. H., of his employment stabilization efforts in the state and at Washington, but a speaking engagement on November 7 prevented his attendance at our Class dinner. — Carl Ell, XI, Vice-President and Dean of Engineering at Northeastern University, Boston, had planned to be at the dinner, but business at the last minute prevented. He reports an unusual state of affairs at Northeastern this year, for this year there is no senior class, due to the change from the four-year to the five-year plan in 1929. From now on all students will be required to complete the five-year program in order to qualify for the B.S. degree. — Admiral Kanezo Goto, II, retired, has been reëlected a Vice-President of the Technology Association of Japan.

As these notes appear in the holiday season, Dennie and Jack heartily extend to 1911 and their families every good wish for a Merry Christmas and a Happy and Prosperous New Year. Please include among your resolutions a determination to write to Dennie! — ORVILLE B. DENISON, *Secretary*, Douglas Inn, Douglas Hill, Maine. JOHN A. HERLIHY, *Assistant Secretary*, 588 Riverside Avenue, Medford, Mass.

1912

It is with keenest regret that we give you the news of the passing of Paul R. Williamson, I. His death, which occurred last June did not become known to us until this time, and it is all the more poignant as Paul, together with Mrs. Williamson, spent three joyful days with us at the big Reunion in June. We know that all those who attended the Reunion will be happy to have the memory of Paul's company during those all too brief hours when we lived over again the days of our youth at the Institute. Paul is survived by his wife, his mother, and a brother and sister. Mrs. Williamson has written us as follows: "Please accept my appreciation for your expression of sympathy in my great loss. As regards Paul's illness, it was of very short duration. Perhaps you remember my telling you during a talk at Manomet that I was concerned about a recent development in Paul's physical condition, which we at the time thought might be nervous indigestion. This condition seemed to grow worse, even while we were all seemingly enjoying our happy time together at the Reunion. On our return home, Tuesday, June 21, we immediately consulted our doctor, who diagnosed his trouble as something more serious, a coronary disease, and advised quiet and rest. He complied with the doctor's advice and seemed to be feeling quite himself again when on Monday, June 27, he was suddenly taken with a severe heart attack, which proved fatal. So you see it was very sudden and quite a shock to all of us. His first attack of apparent indigestion was just 17 days before the last attack.

"I think it was very fine of Mr. Manning to get in touch with so many people for me. I have so far received three sets of pictures and did get some very good ones of Paul in groups from Mr. Priest. I want to thank you for your interest also."

Paul R. Williamson was born at Charlestown, Mass., August 8, 1888. His parents moved to Marshfield, Mass., where Paul went through the public schools and entered M. I. T. with the Class of 1912. His first job after graduation was with the American Bridge Company, as a structural draftsman. In the next few years, while he was gaining his experience, he held various positions, always in his chosen line, structures, with the C. & O. R. R., the Interstate Commerce Commission, American Ice Company, and others. He was one of the regular attendants at the New York luncheons when he was in this city. About 1924 he moved to Hartford, Conn., where for six years he was with the firm of Buck and Sheldon, Inc., as structural engineer and chief draftsman. With the wealth of experience thus accumulated, Paul opened up his own office in 1930, as consulting structural engineer. His most important job was on the new Federal Building and Post Office in Hartford, a million-and-a-half dollar project, which is just now being completed. On this building Paul handled the complete

1912 Continued

structural design, including all reinforced concrete, steel work, foundations, and caissons. The architects, Malmfeldt, Adams and Prentice, have spoken very highly of the way he handled his end of the work. — Paul Williamson was a good engineer, a good husband, and a good friend. We shall miss him as we would a brother.

Efforts are being made by Harold G. Manning, X, to gather all photographs which were taken by various members during the Reunion. He requests that everyone who has good views of individuals or groups, or snapshots of any of the sports, to please send the negatives to him. He will have prints made of them, and will be able to furnish copies to any who wish them. In order to cover his expenses for printing, postage, and so on, he will send the complete collection for $3.00, or a selected group of the best ones for $1.00. Anyone wishing to secure prints, please write H. G. Manning, 136 Grant Street, Waterbury, Conn.

Another of our few remaining bachelors has surrendered! Mr. George Owen Allen announces the engagement of his daughter, Miss Helen Myra Allen, to Mr. Harold Grosvenor Manning, of Waterbury, son of Mrs. Theodore Manning, of New Britain. Miss Allen attended Northfield Seminary. Mr. Manning is a graduate of M. I. T. Congratulations, Harold!

Dr. John A. Allan, III, who is this year President of the Canadian Mining Institute, has also been elected an Honorary Member of the Chemical Metallurgical and Mining Society of South Africa for the year ending June 30, 1933.

A brief note from Jonathan A. Noyes, II, of Chicago, thanks us for the mimeographed Reunion Notes which were sent out last August, and expresses his hope that we will be able to have an even bigger and better Reunion in 1937.

Along somewhat similar lines was a letter from David James Guy, I, who says: "Many thanks for the report of the Class Reunion at Plymouth. I have had an oral report from Hakes, all of which makes me feel badly because I was unable to attend. Hope when the quarter-century mark comes around, that we can have something even bigger and better. I recall very well the fine time we had at Gloucester, at a reunion with some of the older boys, I believe the Class of '87." Guy is connected with the United States Chamber of Commerce at Washington, D. C.

We have had a telephone call from E. B. Moore, VI, who reports that he is now with the Vulcan Electric Heating Company, 225 Varick Street, New York. He has promised us more detailed information about himself which we hope to publish in the near future.

And now for New Year's Resolution No. 8,917,354: "I've gotta turn over a new leaf and start writing regularly to Shep and Mac." — FREDERICK J. SHEPARD, JR., *Secretary*, 125 Walnut Street, Watertown, Mass. DAVID J. MCGRATH, *Assistant Secretary*, McGraw-Hill Publishing Company, Inc., 330 West 42nd Street, New York, N. Y.

1913

The Boston *Herald* for October 17 carried an interesting article about the inauguration of a poor boy's college at Port Royal, Va. The teachers are recruited from those out of employment, and those who can and will donate their services. Among those chosen as one of the starting faculty is Ralph B. Kennard who was at one time in Course X. No further information was forthcoming. Perhaps Kennard will give us further news on this startling innovation.

It is with much regret that the following items appear in the news. The sympathy of the Class is solicitously extended to relatives in their bereavement.

The Boston *Herald* of October 8 carried the following notice: "Maurice W. Salomonson, 42, died yesterday at his home, 172 Harvard Street, Newtonville, after an extended illness. — He was born in Carthage, Maine, and graduated from the Allen School of West Newton and from the Massachusetts Institute of Technology. For 12 years he was a designing architect for the Boston firm of Allen and Cullens. Surviving are his wife, two sons, Bradford and Hubert Salomonson, and his mother, Mrs. Mary Salomonson of Arlington."

W. W. Warner '11 forwarded us a clipping from the *Oil and Gas Journal*. The article read in part: "The oil industry lost an outstanding geologist in the death of Sidney Powers, Ph.D., of Tulsa, which occurred in a St. Louis (Mo.) hospital, on Saturday, November 5, following an operation. . . .

"Doctor Powers had been an official of the Amerada Petroleum Corporation from its inception 13 years ago. He had established an enviable reputation in his profession and was very frequently consulted by fellow geologists, in addition to having the confidence of the corporation with which he had been so long associated.

"Doctor Powers had been in ill health for the past four years, but with great fortitude stuck to his work at the head of the geological department of his company.

"Sidney Powers was born in Troy, N. Y., September 10, 1890. He graduated from Williams College in 1911; was given his master's degree at M. I. T. in 1913, and his doctor's degree from Harvard University in 1915. He remained at Harvard as a research fellow until 1916.

"Dr. Powers next joined the geological staff of The Texas Company. He was connected with the U. S. Geological Survey when the United States entered the World War. He joined the colors and was made an officer in the geological service, serving in France on the staff of General Pershing. His headquarters were in Chaumont. Dr. Powers had the rank of lieutenant. When the war closed he came to Tulsa and assisted in the organization of the Amerada Petroleum Corporation. . . .

"As a writer and speaker on petroleum technology, Dr. Powers was widely known. He was a past President of the American Association of Petroleum Geologists and a member of the Tulsa Geological Society, the Geological Society of America, the Institute of Petroleum Technologists, the Society of Economic Geologists, and the American Institute of Mining and Metallurgical Engineers.

"Dr. Powers was the editor of an important compilation of papers which formed a comprehensive survey of the structure of American oil fields. This publication was authorized at the annual convention of the American Association of Petroleum Geologists a number of years ago and gained very favorable repute. Two volumes were published under his editorship and he was working on the third when illness interrupted him.

"Dr. Powers' work as a geologist in the Sabine Uplift region was one of the important accomplishments of his career and he was regarded an authority on interior salt domes in Texas and Louisiana. . . .

"Surviving Dr. Powers are his widow, Mrs. Dorothy Edwards Powers, two daughters, and his parents, Mr. and Mrs. Albert W. Powers of Troy, N. Y."

A most tragic accident occurred a short time ago at the Sharon railroad crossing. Hap Peck's boy with two other students from the Sharon High School were instantly killed when their automobile was struck by an afternoon New York Express during a blinding rainstorm. The local papers carried accounts of the accident. — GEORGE P. CAPEN, *Secretary*, 50 Beaumont Street, Canton, Mass. ARTHUR L. TOWNSEND, *Assistant Secretary*, Room 3-435, M. I. T., Cambridge, Mass.

1914

Welton A. Snow writes from Los Angeles that the state alleged to have perpetual sunshine is no sunnier than the East Coast when it comes to depression conditions. Something over a year ago Snow left Florida for California but has found that the engineering business is just about at the vanishing point in both states. He is at present trying to apply thermodynamics to the sale of canned orange juice. He intimates that the course in credit and banking, with the banking part eliminated, is a lot more helpful than thermodynamics just now.

The *China Weekly Review*, of Shanghai, China, recently carried a very interesting write-up under the head of "Who's Who in China." The article covered none other than our own Paul H. Hsu, who is now Educational Commissioner of the City Government of Greater Shanghai. From this article it is learned that Hsu has been very actively engaged in important work in China in the past decade. Quite aside from prominence gained in the political field, Hsu has made a name for himself in the field of chemistry. The article states that he is considered the best soap and oil expert in China. Among the political positions he has held are: Secretary General, Shanghai Branch of the Central Political Council; Chief of Division, City Government of Greater Shanghai; Senior Counselor,

1914 Continued

Mayor's Office, Shanghai. In addition to all these things, Hsu has found time to have been President of the Technology Club of China, Nanyang Alumni Association, Chinese Engineering Society, and the Shanghai Branch of the Chinese Institute of Engineers. As if all of these presidencies were not enough, he has served on numerous commissions, on many of which he served as chairman. One of these important commissions and one of which he was chairman was that of Building Houses for Needy People in the District of Greater Shanghai.

Something is wrong with the soap works. Boggs Morrison, exponent of cleanliness and Chief Mechanical Engineer of the large Lever Brothers plant at Cambridge, must have mislaid his free sample of soap. Boggs has been suffering from a series of carbuncles. The committee of investigation has as yet been unable to determine the cause. It may be too much soap burning the skin off, or it may be that the soap is no good. We feel that it is incumbent on Boggs to prove his case to the entire Class of 1914 by sending out free samples in appropriate form.

Last month we wrote that Walter Hauser had left the brass business and had spent the summer enjoying the scenery of New England and was now on a red-hot trail for a new connection. We have just heard from him that he is back again in New York City and is in the stoker business. He is trying to convince New Yorkers that mechanical stokers and powdered fuel are far superior to oil. Here's hoping that he and Ross Dickson, who is firmly entrenched with the Standard Oil Company, do not meet for an argument in the midst of Times Square!

Albert Sherman seems to find time enough away from his duties as Professor of Music at Boston University to be a steady frequenter of the University Club. Like a dutiful father, he takes his three daughters to the children's Sunday afternoon entertainment. We recommend Sherman as an example to all errant '14 men who spend their Sundays at the Country Club, either on the links or more usually inside the clubhouse. Your Secretary is not prepared to count the ballots as to which type prevails in the class.

An anonymous clipping has come to your Secretary telling of the fame of Dean Fales. After a brief introduction, this clipping is quoted as follows: "Although a Professor, Dean Fales does not confine his automobile engineering instruction to pure theory, but actually gets out on the road to find out just what it is all about, and then goes back to give his students the real low down. Right now he is using an eight-cylinder Ford as his mobile laboratory and, as a result, his dash board resembles the control room of a modern submarine. Besides the customary gasoline gauge, speedometer and ammeter, he has equipped it with a split-second stop-watch, a thermometer showing outside temperature, a thermometer showing crankcase, or oil, temperature, a thermometer showing temperature at the carburetor intake, an oil pressure gauge, a vacuum gauge on his intake pipe, and best of all a pedometer is hung on one side which registers the number and the intensity of the bumps." Having ridden with Dean a few times, your Secretary might add that these gadgets are not all with which the mobile laboratory is equipped.

We now have a legislator added to the various titles of our classmates. Porter Adams is now the Honorable Porter Adams, member of "The General Assembly of the State of Vermont." In a letter to his constituency Pat writes: "I believe very keenly that ECONOMY, like charity, should begin at home . . .", and in the following paragraph we learn: "I shall work for the best interests of all Thetford." From this we also learn that Pat has already developed into a real legislator. Seriously, however, we can bet that Thetford is going to get some real red-hot representation during the coming session, and, if road work is decreased, we are willing to bet that there are going to be a few landing fields scattered around the state of Vermont. Pat pledges to work for a reduction in the salary of legislators, and, if he is unsuccessful in accomplishing this, he pledges to return a portion of his salary for general welfare work in his district. One of his first post-election speeches was right here in Boston, where on the evening of November 22 he addressed the Boston Alumni of Norwich University, of which institution he is a member of the Executive Committee of the Board of Trustees.

These notes will arrive right after the beginning of the new year of grace 1933. Following that year comes the year of 1934 at which time we will celebrate the Twentieth Anniversary of graduation. With pickings pretty poor, it is going to take us a whole year and a half to save up the few dollars necessary to attend that Reunion. Let us start saving now, and let us also hope and do what we can to make 1933 a year in the direction of the return of normalcy so that savings will not be quite so hard in 1934. The best of New Year wishes to you all! — HAROLD B. RICHMOND, *Secretary*, 30 Swan Road, Winchester, Mass. GEORGE K. PERLEY, *Assistant Secretary*, 21 Vista Way, Port Washington, Long Island, N. Y.

1915

A big happy and successful 1933 to you all. And with it my belated hopes that you have all enjoyed a bright and cheerful Xmas. With those salutory greetings out of the way, I turn to the harsh realities of the tribulations of a Class Secretary. I presume you are all interested and glad to read our column, I, frankly, take personal pride in writing it. But its success depends on you. I am no mind reader nor magician who can conjure up news and letters from my imagination. I have to get them from you. Despite the fact that you fellows have had a college education, you apparently don't even know how to write. I mean put words on paper. How do you sign your names, with an x? With the following letter I have completely run out of material. The notes for the remaining issues depend on you and you and you.

In answer to my appeal to you men in foreign countries, Huang Chen, V, has sent in this delightful and interesting letter from Sun Yatsen University, Canton, China. With the Chinese stamps and printing on it, the envelope was intriguingly attractive with its atmosphere of the distant Orient. I hope some of us can see Chen when he visits the Institute and thank him personally for his interest in writing us.

"Your good letter of July 9 asking me to write something about myself for next year's 1915 notes in The Technology Review has been received and is much appreciated. I am glad to hear from you and to learn some of the activities of my Alma Mater and classmates whom I know so well. I shall be looking forward to reading those 1915 notes in next year's Review.

"I have been teaching college chemistry ever since my return from the United States in 1915, the year I received my M.S. degree in chemistry at M. I. T. I have always enjoyed my profession immensely, and would not change it for anything. From 1915 to 1925 I was the Head of the Department of Science of the Kwangtung Normal College, a Government institution in Canton, China. When the college reorganized, enlarged, and incorporated under the name of Kwangtung University in 1925, I was appointed head of the Department of Chemistry, holding that post for two years. In 1927 the institution underwent another reorganization and became Sun Yatsen University in memory of the late Sun Yatsen, revered throughout the nation as the Father of the Republic of China. The University was again considerably enlarged, and several new colleges, including the College of Medicine, were added to it. I took an active part in the reorganization and became, from 1927 to 1930, Dean of the College of Science. In 1930 the College of Science was amplified to include engineering, and was called the College of Science and Engineering with me at the head as before. Thus you see I have been actively connected with the educational work in Canton, China, for the last 17 years; that is, since 1915 when I left M. I. T.

"I am now on furlough, and am going to the United States to spend it. I am sailing for the United States by the S.S. *President Taft*, which is expected to leave Hong Kong for Seattle on August 20. I expect to arrive in Seattle on September 6 or thereabout. It is my desire to make an extended study of the educational conditions in the United States, with a view to improving the system of college education here in South China. The new ideas and ideals in education that I hope to get during my coming sojourn in the United States will undoubtedly be of great value to me when I return to my country again. Above all things, I shall make it a point to visit my Alma Mater

1915 Continued

and to call on you and other members of the Class of 1915, whom I used to know so well. I do not know exactly when I can be at M. I. T., probably during the latter part of this year or the early part of next year.

"Canton is a wonderful city, teeming with activities and revolutionary ideas. It is the birthplace of the Chinese National Revolution and is, perhaps with the exception of Shanghai, the most highly modernized city in China. The streets and avenues are now just as wide and smooth as those found in any large city in America. Automobile service, electricity for both lighting and power, water piping system, automatic phone service, radio, and other things which go to make up our Twentieth Century civilization are all found in Canton. Everything of the world may be found in Canton, it is said; but there are many things which may be seen in Canton only and in no other parts of the world. Cantonese are the purest of the Chinese race, and Cantonese cooking and Cantonese handicraft represent the best effort. The city boasts no large factory and has no trust or other world monopoly, but it has on exhibition hand-carved, hand-embroidered, and other hand-made articles which defy human imagination. The people here are thriving and are comparatively better off than those dwelling in any other part of China. I have always enjoyed living in Canton, despite its occasional maladministration, partisan war, and other political unrests which you sometimes read in newspapers.

"There are about a dozen or so M. I. T. graduates in Canton, all doing exceptionally well in their chosen lines. Some are in Government service, some are teaching school, and some are in business. Thus Dr. C. T. Chu '22 is Professor of physics and Head of the Physics Departments of the Sun Yatsen University, E. L. Chao '22 is an engineer in the Bureau of Public Works of the Canton Government, and Y. M. Chu '14 is an electrical engineer in the Canton Electric Power and Lighting Company. — With best regards to you and other classmates of 1915."

As I reread Chen's letter I am impressed with the work he is doing and I marvel at the far-flung activities of Technology's men. — Give another thought to my opening paragraph. — AZEL W. MACK, *Secretary*, 379 Marlboro Street, Boston.

1916

When in Boston recently I was glad to run into H. E. White. He is still in the Engineering Department of the Stone and Webster Company and reports that although new business projects with them are decidedly few that they are decidedly optimistic and look forward to some good volume of business this coming year.

My travels took me to Providence recently and while there I had the opportunity of calling on Hovey Freeman. I was sorry to learn that his father just recently passed away but was pleased to note that Hovey has been made President of six large insurance companies in his father's place. He certainly has some job ahead of him, as I understand that this insurance group has a larger amount of outstanding policies than any other similar organization.

I was pleased to receive the following newsy letter from Hovey: "I am sending to the Alumni Athletic Fund a Class check for $25 in accordance with your suggestion. It might also interest the Class to know that the balance in the Class Treasury is $413.66 and that any of our classmates who have been short in the market during the past three years might come across and build up this fund. They certainly should do something for their Class if not for their country.

"I have not much information about Class news. Had a letter a day or two ago from Raymond Stowell who stated that he was looking around for a new connection because he has found that the architectural business just isn't these days, and that with a new home and a family to support he has got to get going. — I see Thuron Curtis occasionally at lunch. He used to be in the jewelry business in Attleboro, but he is now connected with our largest Trust Company here in their Trust Department having something to do with life insurance. — I have seen a good deal of my brother Jack recently as he has been up here helping us in the settlement of my father's estate."

N. J. Thompson drops in at my office from time to time on "Fire Prevention Inspection Work." He is in the Boston Office in the Inspection Department of the Associated Mutual Fire Insurance Company. He takes golf quite seriously as does naturally your Secretary. — HENRY B. SHEPARD, *Secretary*, 269 Highland Street, West Newton, Mass. CHARLES W. LOOMIS, *Assistant Secretary*, Bemis Bro. Bag Company, Memphis, Tenn.

1917

Many of the other classes, both before and after 1917, have Assistant Secretaries. The term "assistant" is perhaps unfortunate, for in some instances that have come to my attention, the notes are prepared in the main by the assistants, while the Secretary gets the blame. It occurs to me that one or more assistant secretaries of this type might be of very real advantage to us, not to save the Secretary any effort, but to bring to these notes more frequent word from members of the Class with whom he is not frequently in touch. Your Secretary would welcome any suggestions as to the manner in which this purpose might be accomplished, provided it seems worth while. I may add that if there is any hesitation in suggesting one or more men because the title of Assistant Secretary has any undesirable connotations, the present Secretary will be quite willing to reverse the position. — RAYMOND STEVENS, *Secretary*, 30 Charles River Road, Cambridge, Mass.

1918

To a Secretary who has cast much non-returning bread upon the postal waters in the form of letters asking for news, the following letter from J. H. Miller was almost complete recompense: "On my return today from a two weeks' absence in Detroit I found your letter of the 8th. I am at a little loss to fully understand it or just what it is you want me to do. Unfortunately I am not a graduate of your most highly honored institution. I registered as a special student some 16 years ago and attended classes in mining, but I have no degree or certificate.

"My work was primarily as a medical man in which I do hold a degree obtained some 32 or 33 years ago. Later I engaged in mining matters as shown by my letterhead. In this I try to help shape the destiny of large bodies of iron ore in Michigan. If there is anything special I can do for you in response to your letter, I shall esteem it a favor to comply." To J. H. Miller, physician and mining engineer, our gratitude for his courtesy and our best wishes for his success.

From Yale Evelev comes a post card marked Venezia, which we never heard of. Evidently Evelev didn't stay there long because the picture shows a flood in the streets at the time of his visit. He says the glaciers of the Jungfrau are still moving down the mountain, but too slowly to apply $S = \frac{1}{2}AT^2$.

One is continually reminded of old and happy far-off things in the most unexpected ways. One Friday in November a student asked ye Class Secretary to be pinch-hit speaker for him at a boy-scout demonstration, Hecht Neighborhood House, Boston. Who do you think proved to be the scoutmaster? Edward Sidman! Been at it for years, has a grand time teaching the kids how to tie knots or apply a tourniquet to a man who has cut his jugular vein.

Plans for the reunion next June have not come to a boil yet but the New York crowd deserve credit for furnishing most of the fuel to date. By the time this reaches you a circular concerning hows and wherefores will doubtless be in the mail. — F. ALEXANDER MAGOUN, *Secretary*, Room 4-134, M. I. T., Cambridge, Mass. GRETCHEN A. PALMER, *Assistant Secretary*, The Thomas School, The Wilson Road, Rowayton, Conn.

1920

If you live around Boston or vicinity, I do not need to tell you that one of our well-known classmates featured in front page news, with the headlines: "Honeymoon Yacht Saved — Society Pair, Just Wedded and on Cruise of Coast, Rescued by Fisherman."

Let me quote further: "Their sail torn to shreds and the auxiliary motor disabled, Mr. and Mrs. Henry Haskell, honeymooners, were rescued eight miles off Scituate by the fishing schooner *Rose Marie* and were towed to the Boston Fish Pier.

1920 Continued

"They were married at a big wedding ceremony in Barnstable, July 30, and started a romantic bridal cruise along the New England coast. The master of the fishing schooner noticed a bath towel flying as a signal of distress on the *Brynhilda*, the honeymooners' 33-foot yawl, as he was hurrying to Boston with his fishing catch from Cape Cod. He immediately pulled alongside and threw the disabled boat a tow line.

"Mrs. Haskell was Miss Emily Morgan Hussey, daughter of the Rev. and Mrs. Alfred Rodman Hussey of Plymouth. She is a graduate of Pembroke College. Mr. Haskell is President and Treasurer of the Brunswick Worsted Mills, Central Falls, R. I.

"After the wedding the young couple decided to sail along the coast to Bailey's Island, Maine. After putting to sea late in the afternoon they encountered a blow which tore loose the jigger, ripped away the gaff and jib. The gas line to the auxiliary motor proved to be clogged, leaving the couple in a perilous situation until picked up by the fishing schooner."

Another notable wedding was that of Jimmie Moir to Miss Marion Winsor Freethy, daughter of Mr. and Mrs. William J. Freethy of "Slim Birches," Waban, on October 1. The bride is a graduate of Miss McClintock's School of Boston. Mr. and Mrs. Moir are now at home in Belmont after a wedding trip in the South.

Another of our classmates who has been attracting considerable attention in the public prints is Townsend H. Hingston, who bids fair to take a place with his father as a famous handwriting expert. Hingston is primarily concerned with the science of handwriting analysis for identification. He has, however, done some interesting character study and analysis from handwriting, and a recent feature article in the Sporting Page of the Boston *Herald* shows how he analyzed the signatures of some of the local football stars and pointed out how much of a help such a study would be to coaches. Hingston's address is 38 Davis Street, Wollaston, Mass.

Ed Farrow is still living in Rochester, N. Y., address 230 Cobbs Hill Drive. — Stanley Reynolds has left New York City and is now in New Haven. — Bob Tirrell is in Woodbury, N. J., address 235 S. Davis Street. — John McLeod may be reached at 615 North King's Road, Los Angeles, Calif. — Charles Lawson is in Evanston, Ill. — Grant French has left Chicago and is now in Cincinnati, address 6786 Chestnut Street. — Jim Blodgett is in Columbus, Ohio, 1982 Stratford Way.

These Jerseyites are always moving around. Heinie Forrest is now in W. Englewood, N. J., 1326 Hastings Street; and Harry Kahn is now at Matawan, N. J., address 79 Lake Avenue. — M. B. Littlefield has gone to New York, his business address being Room 3335, 120 Broadway. — Bill Meissner has moved over from Jersey to New York City at 30 West 52nd Street.

Bob Pender is living in Marblehead, Mass., at 7 Thompson Road. Bill Schimmelpfennig has been located in Waco, Texas. H. H. Smith has left Buffalo, N. Y. and is living in Hamburg, N. Y. Mildred L. Coombs' new address is 4808 Garfield Avenue, S., Minneapolis. — HAROLD BUGBEE, *Secretary*, 7 Dartmouth Street, Winchester, Mass.

1921

Your Assistant Secretary had a very pleasant get-together with our Boston correspondent, Chick Kurth, during his flying trip to New York to see the Army-Notre Dame football game. Boston winters will henceforth hold no terrors for Chick after he explored northern New Jersey on the coldest day so far this season, trying to find us in Chatham!

Kendall Preston, who has until recently been engaged in various trust activities with the Old Colony Trust Company in Boston, has been elected a Vice-President of Anderson & Cromwell, investment counselors. Following his graduation from the U. S. Naval Academy, Ken served overseas during the war. On his return he obtained his degree in Course II at the Institute and spent several years in research work, later joining the First National Corporation. In 1928 he became connected with the statistical department of the First National Bank of Boston and in 1929 he was made Secretary of the First of Boston Investment Management Corporation.

From the *Newark Evening News* of November 17: "Miss Mary Gay Brooke, daughter of Mrs. Horace L. Brooke of Newark, became the bride of John William Rockefeller, Jr., son of Dr. and Mrs. John William Rockefeller of New York and Allenhurst, at a ceremony performed yesterday afternoon at the rectory of St. John's Church, Orange, N. J. The bride was graduated from Prospect Hill Country Day School and attended Ogontz and Katherine Gibbs schools. Mr. Rockefeller received his degree in Course IX-B at the Institute. On their return from a motor trip to the South, the couple will be at home at 33 Fifth Avenue, New York City."

Personal: Will anyone having information regarding any member of the Class please forward same to your secretaries? All is forgiven for broken New Year's resolutions! — RAYMOND A. ST. LAURENT, *Secretary*, Rogers Paper Manufacturing Company, South Manchester, Conn. CAROLE A. CLARKE, *Assistant Secretary*, University Avenue, Chatham, New Jersey.

1923

At the risk of further swelling the amount of publicity which has been given to the matrimonial venture of Al Pyle, VI, I think you ought to have his own account of himself: "Last August a profound change came o'er me. Miss Mary Rowena Nash and I were married at Eastern Point, Conn. Milady is the daughter of Mr. and Mrs. John Burnet Nash of New York City and is a graduate of the Child Education Foundation. We have a cozy nook three blocks from the water in the Bay Ridge section of Brooklyn.

"Another change is that the Ford Instrument Company of Long Island City, for which I was technical writer, lost contracts as a result of the depression and is running at such a low pulse it had to let most of the employes go. Fortunately I found a new position as teacher of advanced physics in Stuyvesant High School in New York City. This work embraces electrical and mechanical theory and machines and is surprisingly advanced for a high school. I am thoroughly interested in the work and have developed some new stunts. The latest is perfection of a demonstration oscillograph with rotating mirror driven by a 30/60 rpm motor of the electric synchronous clock type. The whole thing was built in the school here. We have an electrical club which meets weekly and has great times with Tesla coils and other apparatus."

Ed Clendenin, XV, writes: "The cause of my change of address was a transfer from Pan-American Petroleum and Transportation Company to Standard Oil of New Jersey with the purchase by the latter of the former's foreign assets. (You will note I was included in the assets.) The move took me to Bayway Refinery at Elizabeth, N. J., to which I commute daily (from Cranford, N. J.)."

Major Archie S. Buyers, II, of the Army Ordnance has entered the Harvard University graduate school of Business Administration. He had previously been stationed at Aberdeen Proving Ground.

Dr. John W. W. Sullivan, III, reports that he is with the Beryllium Development Corporation at Marysville, Mich. (some 60 miles north of Detroit). He says: "At present I am engaged in research, development, and production of metallic beryllium and beryllium alloys. As you may know, this metal had been isolated about a century ago, but until the past decade the prospects of commercializing it had not materialized. During the past five years or so it has been finding its way into industrial applications, and my job is to keep the good work going."

H. A. Barnby, V, has developed a process for the vacuum packing of coffee in glass. The Owens-Illinois Glass Company, for whom he is laboratory chief, expect this to bolster its sales volume. Barnby has been identified with glass products for some years, having previously been in charge of the chemical works of the Glass Container Association.

Dale Washburn, VI, was married on October 22 to Eleanor Neil of Boston. The couple will make their home in Melrose. — Clayton F. Harvey, I, was married on October 26 to Phyllis L. Enegren of Franklin, Mass. Mrs. Harvey is a graduate of the Katherine Gibbs School. Both of the above items and the following on the unimpeachable authority of the Boston *Transcript*.

The engagement of Alice Neilsen Blanchard of Montpelier, Vt., to John B. Carpenter, Jr., X-A, has been an-

1923 Continued

nounced. Miss Blanchard is a graduate of the Boston School of Physical Education and Middlebury College. She is now professor of physical education at the University of Vermont. Carpenter is on the staff of Arthur D. Little, Inc., of Cambridge. No date has been set for the wedding.

L. H. Rice, IX-C, explains a recent address change from 89 Marlborough Street, to 50 Commonwealth Avenue, Boston, as merely a move to quieter quarters, the better to attend to the homework incidental to his job as Assistant Professor of Mathematics at the Institute. — HORATIO L. BOND, *Secretary*, 195 Elm Street, Braintree, Mass. JAMES A. PENNYPACKER, *Assistant Secretary*, Room 661, Eleven Broadway, New York, N. Y.

1926

The recently published pamphlet, "Officers and Committees of the Alumni Association of the M. I. T.," shows an increasing number of '26 men taking part in the far-flung activities of Technology. Particularly for the benefit of those members of the Class who travel, let me note some of these:

Oliver R. Etheridge, Secretary-Treasurer, Atlanta Alumni Association, Georgia Power Company, Electric Building, Atlanta, Ga.; B. Varnum Howe, Secretary-Treasurer, Rocky Mountain Technology Club, State Sanitary Engineer, 437 State Office Building, Denver, Colo.; John E. Longyear, Secretary, Detroit Technology Association, 2000 Second Avenue, Detroit, Mich.; Maurice W. Davidson, Secretary-Treasurer, Technology Club of Central Pennsylvania, Bell Telephone Company, 210 Pine Street, Harrisburg, Pa.; Thomas D. Green, Secretary-Treasurer, Technology Club of Hartford, 41 Westfield Road, West Hartford, Conn.; John R. Kimberly, Secretary-Treasurer, Technology Club of the Fox River Valley, Kimberly Clark Corporation, Neenah, Wis.; Richard H. Pough, Secretary-Treasurer, Technology Club of Philadelphia, 1600 Sansom Street, Philadelphia, Pa.; L. C. King (L. C. Chin), Secretary-Treasurer, Technology Club of Shanghai, P. O. Box 434, Shanghai, China; Joseph Y. Houghton, Secretary, Washington Society of the M. I. T., 402 Shepherd Street, Chevy Chase, Md.; and F. Gurney Fine, Jr., Honorary Secretary for Philadelphia, appointed by President Compton to act as an academic ambassador, 109 County Line Road, Bryn Mawr, Pa.

Ted Mangelsdorf represents the M. I. T. Alumni Association of Nashville on the Alumni Council in Boston, while Robert B. Morrissey represents the Technology Club of Merrimack Valley. A. W. K. Billings, Jr., is a member of the Advisory Council on Undergraduate Publications; Robert C. Dean, a member of the Advisory Council on the Boathouse; and William P. Lowell, Jr., of the Advisory Council on Musical Clubs.

Newton Wakefield is engaged in an interesting enterprise at Spokane, Wash. He is Vice-President of the Mamer Air Transport Company which specializes in the transportation of freight and supplies to remote places inaccessible by other means of transportation. His company has done important work of this type for the United States Forest Service and for various mining projects.

Walter Crafts of New York was married on October 15 to Miss Suzanne Clifton of Sharon, Pa. He is now associated with the Union Carbide and Carbon Research Laboratories, New York. — Mooney Owen, still with Sears Roebuck, has shifted his base of operations from Chicago to Syracuse. When last heard from he was traveling in Texas for his company. — Bill Lowell, who is with the Hygrade Sylvania Corporation in Salem, Mass., travels extensively for his company, and the Secretary has had the pleasure of giving him the addresses of '26 men in some of the places which he has been visiting. The Secretary will be glad to extend this service to other traveling members of the Class who would like to get in touch with their classmates. — J. RHYNE KILLIAN, JR., *General Secretary*, Room 11-203, M. I. T., Cambridge, Mass.

1930

COURSE II

Note: All news items given below are positively guaranteed not to be over ten months old!

Ray Binder at California Tech has run across Dean Batchelder '28, Willie Beard '28, and Ernest Lyons '31, all doing advanced work at the same place. — Joe Harrington and Alene Smith were married September 17. Congratulations, Joe.

Ed Huson took a crack at the synthetic nitrogen industry with Allied Chemical at Hopewell, then went back to the Institute for a year of graduate Business Administration, and now is with Chase Harris Forbes. Ed admits a passion for high finance. In and about the big city he has encountered John Guinan and Harold Spaans.

Bryant Kenney is at the hydrogenation plant of Standard of New Jersey. He has had the misfortune to encounter a lot of shift work. In case you have never encountered it, shift work is a most disagreeable feature of process industries. Bryant says Bob Nelson is working for the American Steel Foundries in Indian Harbor, and Sam Woodruff is on his way around the world working for the Dollar Line.

Bill Paine is assistant to the chief engineer with the Bragg-Kliesrath Corporation, a division of Bendix Aviation. He is at a large new plant at South Bend where automatic clutch controls are made. Bert McLeod '31 is an experimental engineer there. Bill is another man to be congratulated. He was married to Miss Marjorie J. Barkley of Winthrop last June.

Max Wheildon returned to the Institute for a master's degree in automotive engineering. He relates how last winter Bob Sidur paid him an unintentional visit. It seems that Bob was in Springfield, intending to take a bus to New York and got on the Boston bus by mistake. When he woke up he was in Worcester; hence the visit to Max in Framingham.

During the past half year I have had the good fortune to see a number of the fellows. Twice I have been in Akron and have seen Jack Bennett, Mr. and Mrs. Phil Holt, Jim Holden, Ted Riehl, and Fluque Rowzee. The Class of 1930 is certainly well represented at Goodyear. I spent an evening in Rochester with Nelson Cooper. He and Kay are now the very proud parents of a little daughter. In Brooklyn I found Pit supporting a Ford V8.

How about sending a line or two to help out with this column? About half of those stamped and addressed envelopes have not been returned yet. — ALLEN LATHAM, JR., *Secretary*, 2106-A Kanawha Street, Charleston, W. Va.

1929

COURSE X

Laurence Tufts sent in the following items of interest: "A letter from Glenn Andrews describes a two-week vacation in Detroit. While there, he won the tennis tournament at the country club near Pontiac, Mich. 'I finally entered, and to my surprise and the surprise of everyone else I emerged several hours later with a most beautiful blister on one toe, and the loveliest little loving cup you ever saw. I won four straight singles matches, including a 7-5 match in the semi-finals which I took from my own brother-in-law.' He also enclosed a photograph of Priscilla Elizabeth Andrews, age six and a half months, sitting in a 'high chair' and looking just a wee bit uncertain as to what the next move would be.

"Tacks Crosby is working with Andrews at the Shell Oil plant and finds very little time to write letters. We hear that a certain girl requires 99 and 44/100% of his spare time. That ought to be quite a good deal of time these days. Who is she and what has been happening in the three months since we last heard?

"John Trahey headed for Boston for Thanksgiving Day and I spent that time at home in Syracuse. — To other members of the Class, the wish is expressed that their unreported activities of the summer are not concealed because of disappointment in the eclipse of August 31, which was concealed by clouds at so many points where they might have gone. I went to Magog and didn't need any dark glass to hide the glare of the sun." — Laurence is still in Rochester but has moved to 53 Magee Avenue. — PAUL V. KEYSER, JR., *Secretary*, 550 West 114th Street, New York, N. Y.

1931

As the new year is on us, let your Secretary wish you all a prosperous and Happy New Year. Met Joe Ryan not so long ago and he had considerable news about some of the Course XIV luminaries. He is working for the Waltham

1931 Continued

Watch Company and although they have not been too busy, still they haven't given him the works. Al Kay has a fellowship at the University of California. Charlie Charles has become a Framingham farmer in the back-to-the-earth movement that is so prevalent. Freddy Jelen and Al Ziegler continue their studies, at least Al does, for he is back at the Institute. Freddy is at Harvard.

Eddie Abbott was caught singing "Take Me Back to Hackensack" by his boss and is now, I believe, assistant manager of the Sears Roebuck store in that town. Good luck, Eddie.

Ed Starr, the old grease pourer of *Technique* rush fame, has been made Assistant to the President of the University of Miami.

Had a letter from Irving Finberg, who is at the Harvard Law School. It reads as follows: "I just read the November issue of The Review and am thereby inspired to write a little about some of the boys I know. To start with XVII: Fliv Ford with the Prudential Insurance Co. at Newark, Christofalo with John Lowry, Leo Reed with his father in Greenfield, and getting fat on the job, too. Same goes for Enio Persion, except the locality is down at Post Office Square on the new P. O. job. Dan Grieco is married and with the State Board of Highways. Various others unemployed or doing something entirely different from Construction.

"Roy Chamberlain and George Holst are still in Cambridge, the Law School here, but in their second year. — Pete Loewe with Chrysler Company at Detroit along with Gene Laurie. Gene Macoy married in Chicago last month. Don't know the *femme*. Red Perkins with a glue manufacturing company in Medford. H. Davis just finished the preliminaries for his Doctor's at the Institute. Saw Gil Ayres the other day; he's still on the Doctor's in Biology.

"Sam Bensinger was heard of in Washington recently doing something in the business world. Sam Nordlinger finally got through the Institute. (I guess he belongs to our Class, he's been around it so long.) — Larry Gonzalez isn't doing much in Newark but some private studying. Anton is at the Business School here, along with Robinson. I believe Bob Leadbetter is over there, too.

"The I-A bunch got as bad a break as any of us. Frank Simons is on the New Independent Subway System in New York. Kamy, Lappin, and Brennan are working at whatever comes their way, and holding on to these jobs as long as they can. Westerfield is with his father in the provision business in Chicago. Some one told me Lee Gibbs is at Erie, or Phoenixville, Pa., as a metallurgist.

"Elmer Hughes is down near Bridgeport, along with Tom Dunleavey. I can't swear as to their occupations but believe it's not very profitable, nor lasting, and not in their chosen fields. Tony Pruckner is still around Cambridge, but I don't know what he is doing. . . . I've written about all I know. Hope you can use some of it."

George Humphreys is doing scales promotions work for the Fairbanks, Morse, Inc. Good luck, George, it's a break for you and the company.

All for now, see you next month. — JOHN M. MACBRAYNE, JR., *General Secretary*, Room 1–181, M. I. T., Cambridge, Mass.

1932

COURSE II

Who said depression? Every man in Course II is busy; some in good positions, and a few in the bread business — just loafing.

Professor Rogers said to marry the boss's daughter. Fellows, do you remember the picture of the beautiful girl on Walt Birnie's desk in the dorms? That is the boss's daughter, and Walt also has a position in the United Shoe Machinery Company. Walt, you deserve it. Other members of our Course have been caught by Cupid. George Colby has been married. Ben Wilbur is married to a young lady from Greenfield. Ben is manager of the Greenfield Branch of the Singer Sewing Machine Company.

Bill Alexander is working for the Scott Paper Company, operating one of their big paper machines. Boothby is busy selling apples and cider at a roadside stand up country. Braxton and Cooper are at M. I. T. pursuing higher degrees. Campbell is working for the Petroleum Heat and Power Company. Danforth is taking the unemployment courses at Technology and high school extension courses at Swampscott. Al Dunning is at Pensacola, Fla., with three other Technology men, flying for the Navy. Great stuff, Dunning!

Tom Jenkins served two active duty periods with the Organized Reserves this summer. Tom, Earl Longfellow, and Ruggles are at Harvard Business School.

Lawton is engineer for the Lawton Engineering Corporation which is selling the General Electric oil burner. Burritt is working with him. — Charles Martin is working for the Buckley and Scott Utilities Company, inspecting oil burner installations. Martin attended active duty training with the Organized Reserves at Fort Wright, N. Y., this summer. — Norman Paquette, the leader of men and the A. S. M. E., is in Detroit selling automobiles. Don Morgan, Dick Park, Charles Pierce, Blackey Powell, Stew Roberts, Robson, and Jack Stover are employed, but we do not know what at, or where. — Joseph Welch is at Babson Institute with a scholarship.

Bob Wright was at active duty with the Organized Reserves this summer. Upon invitation from Charles Stark Draper of the Aeronautical Department, he started a flight to California which ended in a forced landing in St. Louis, Mo.

This is unofficial information obtained indirectly. No one replied to the cards sent out. This is an excellent showing for the existing business conditions. — NORMAN O. PAQUETTE, *Secretary*, 172 Sandwich Street, East Windsor, Ontario. ROBERT W. WRIGHT, *Assistant Secretary*, East Street, Dedham, Mass.

COURSE III

Reports from Course III fellows, though few, are encouraging. A letter from Keskulla tells us he landed a job in June with the King Solomon Mines Company at Black Bear, Calif., a gold property, and is on the crew building a new plant on an old site. He hopes to break in on a shift after operations start in the near future. He reports the country to be in the wilds of nowhere and "on its beam ends"; and describes himself in the well-known words of "Nature in the Raw."

Tom Hartigan reports having gone even further from blast furnaces and such. He started with the U. S. Rubber about the first of October, driving a truck, but with lots of prospects for advancement. We are expecting tires from you now, Tom, that will wear like iron.

That makes three out of 24 to report jobs: Chapman, as noted in November, and now Kes and Hartigan. More power to them!

Chadwick spent last summer in camp in New Hampshire, but has had no luck since in getting located. Curtin returned to M. I. T. in September for a little more work, and I understand is helping Professor Hayward on the side in his lead softening process.

No further information has been received to date. Let's hear from the rest of you. The 1932 Course III unemployed apparently still remain in the majority so don't be afraid to say so, and if you have a job, we want to hear it to encourage the rest. — HENRY J. CHAPIN, *Secretary*, 101 Ardmore Avenue, Ardmore, Pa.

COURSE XIV

Here is information concerning every man who graduated in Course XIV — all four of us.

To begin with, Thomas J. McNaughtan is working for his father in Buffalo. The nature of his work seems to be a dark secret. F. Rolf Morral dropped into the electrochemical lab. last week and announced his departure on December 2 for Stockholm, Sweden, where he intends to enter the Stockholm Hogskola. He is to study x-ray metallography under Dr. A. Westgran of the *Institute für allgemeine und anorganische Chemie der Universitat* in Stockholm. As for the other two members of the Course, namely, George H. Sistare and myself, we are back at the Institute in an effort to obtain degrees of Master of Science. — EUGENE F. LYNCH, *Secretary*, 77 Hampden Street, Indian Orchard, Mass.

COURSE XV

Deep secrets hastily scraped off a struggling corresponding Secretary's brain: (Incidentally, to John Finnerty, U. S. A., and to dear old 1-181, our Alma Mater, we owe these choice bits. But to get on.)

T. Willie Regan has as yet found no venture upon which to concentrate his mental and physical capabilities. What a small world this is, after all! Tut Rus-

1932 Continued

sell (Finnerty dictated these *nom de plumes*. I do not guarantee their authenticity) is "ruining the Peeping Tom industry, designing bigger and better window shades somewhere in Connecticut." — Herb Ross is with the New England Telephone and Telegraph Company, holding down a line man's job. Up one minute, and down the next. — Brady and Reese, who always hogged the front seats, now occupy a similar position in the bread line. — Charlie Taylor is bolstering up conditions and other things, designing cushions for motion picture houses, with Paramount-Publix paying his salary.

Johnnie Leslie is still on the dole, but, as do the majority of loyal citizens, cheers the Democratic banner as the dawn of a new day. Maybe next year's picnic will be worth returning to, and with bigger buckets! — Joe Kane is back at Technology, doing graduate work in reinforced concrete design. — Art Marshall is shipping clerk for the Malkin Motor Freight Company, and manager of the Boston Office.

I'll let Finnerty speak for himself. He outlines his career as follows: "United States Army for two months at Fort H. G. Wright, N. Y. Transportation Department of the First National Stores. At present have taken a position as field engineer in the factory office branch in Boston of the Gilbert and Barker Manufacturing Company, a subsidiary of Standard Oil of New Jersey."

And now for some general notes. Bill Barker is still with Firestone. Ben Archambault is with Chase Harris Forbes. Del Cannon is in Trion, Ga., with the Regal Textile Factory. Castle Day found Technology comfortable and has returned for Master work in Course XV. Ed Fritz is in Remington-Rand sales work. Roy Haeusler is with Professor O'Connor as an assistant. Charlie Isselhardt is in St. Louis with Shell Petroleum. Harry Moore is working Cleveland. Dinty Moore, as we have mentioned before, is with Brooklyn Union Gas. Al Mulliken is with the U. S. Shoe Machinery Company. Scharnberg is with the National City Bank in New York City. Jim Shackelford has gone with W. T. Grant. Henry Worcester is in Washington with a new laundry concern. — ADDISON S. ELLIS, *Secretary*, 83 Washington Boulevard, Oshkosh, Wis.

COURSE XVI

A few more cards turned up, but they were just too late to make the last issue. Joseph French worked during the summer but was not certain what the winter had in store for him. Moses Gelinas was touring the U. S. to try and find out what makes the wheels go around. John Lyon is working for his father in the hair felt pad and insulation business.

Johnny Jewett is a Reserve Student Officer stationed at the Naval Air Station, Pensacola, Fla. He says that the ground school is fun after last year's work at the Institute.

Johnny Lawrence is working for the present with the Green Mountain Marble Company just outside of Rutland. — JOHN LAWRENCE, *Secretary*, 17 Washington Street, Rutland, Vt.

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INFORMATION

THE TECHNOLOGY REVIEW BUREAU exists to supply authoritative information to anyone interested in details regarding the Massachusetts Institute of Technology. It serves as a clearing house for inquiry and aims to further the spread of exact information regarding entrance requirements, outline of courses, subjects of instruction and other information which may be of aid to the students considering undergraduate or graduate study at the Institute.

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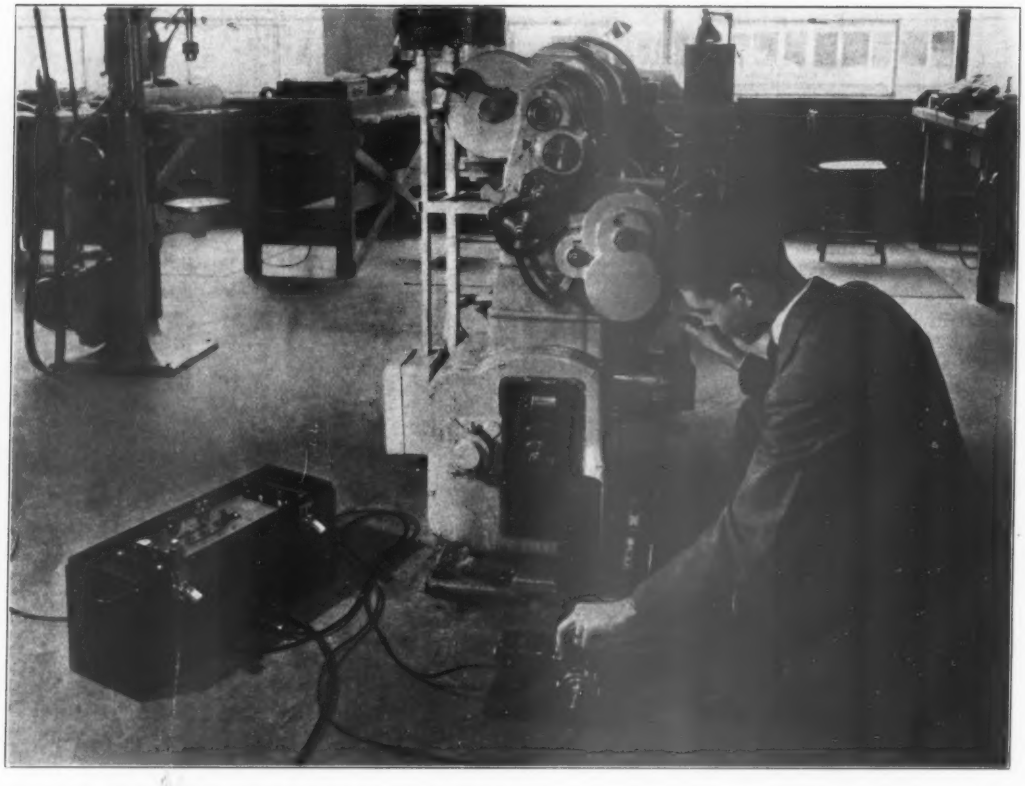

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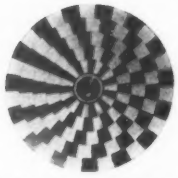

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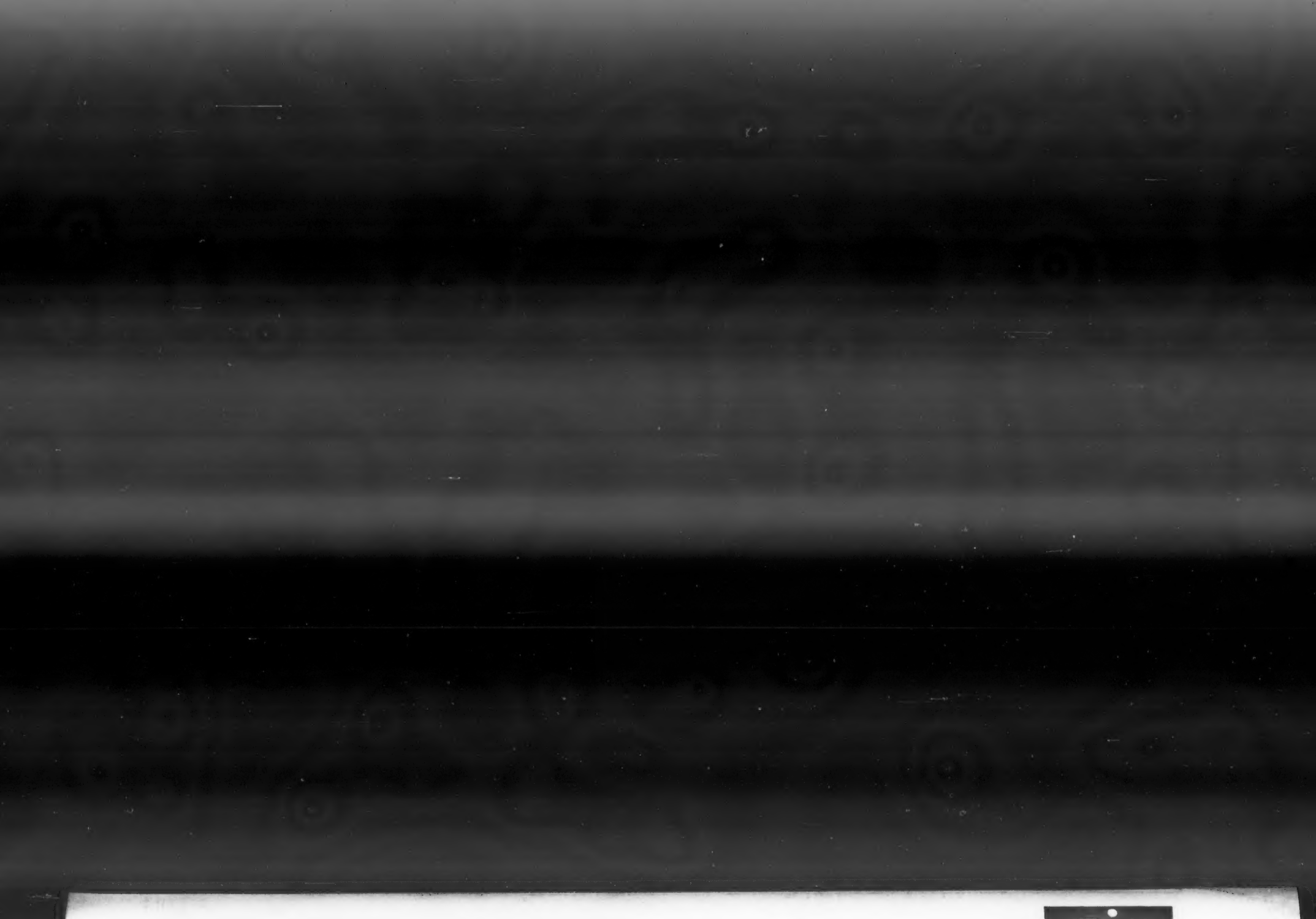
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